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Cockerell, Theodore Dru Alison
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APR 19 1919

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[Reprinted from BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY, Vol. XI, No. 1, February, 1916.]

TWO NEW BEES FROM NEW JERSEY.

Theodore Dru Alison 1866-

BY T. D. A. COCKERELL, Boulder, Colo.

Halictus floridanus caesareus subs. nov.—♀. A little smaller; face and front dark blue, the clypeus shining; mesothorax blue-black, densely and finely punctured, dull; scutellum somewhat shining, purple-blue; area of metathorax blue-black; abdomen without metallic tints. As in *H. floridanus* Rob., the head is oval, with a narrow face, and the hind spurs have extraordinarily long spines.

Hab.—Ocean Grove, N. J., July 12, 1893; collector unknown. The name is derived from the ancient name of Jersey. This looks like a distinct species, but it agrees in structure with a specimen of *H. floridanus* received from Robertson, though the color is very different.

Halictus oceanicus sp. nov.—♀. Length about 6.5 mm.; robust, rather dark blue-green, with dull white hair; tegulæ rufopiceous, well punctured on anterior half, rounded behind; wings hyaline, conspicuously suffused with reddish, stigma and nervures ferrugineous; areas of metathorax with very coarse rugæ; posterior truncation very sharply margined; abdomen dak green, shining, polished, hind margins of segments suffusedly reddish, fourth segment rather thinly covered with white hair; hind spur with long spines. Closely related to *H. nymphæarum* Rob., but differing thus: Areas of metathorax with fewer rugæ, wings reddish, abdomen strongly metallic; both head and thorax distinctly narrower. It is, perhaps, a subspecies of *nymphæarum,* but if so a very distinct one.

Hab.—Ocean Grove, N. J., July 12, 1893; collector unknown.

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MAIS ALGUMAS COCCIDAE

Colligidas pelo Dr. F. NOACK

POR

T. D. A. Cockerell
Entomologista da Estação Experimental de agricultura do N. Mexico, E. U. de America

◆

Da Revista do Museu Paulista — Anno III 1898

S. PAULO
Typographia a Vapor de Hennies Irmãos, Rua Caixa d'Agua 1-c
1899

MAIS ALGUMAS COCCIDAE

Colligidas pelo Dr. F. NOACK

Por T. D. A. Cockerell

Entomologista da Estação Experimental de agricultura do N. Mexico, E. U. de America

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(1) *Chaetococcus bambusae* (Mask.) Mask. Nos bambús em Campinas, Brazil. (Noack 75). Novo na região neotropical.

(2) *Asterolecanium miliaris* Boisd. Nas folhas de bambús em Campinas. (Noack 74).

(3) *Lecanium (Calymnatus) rhizophorae,* n. sp na folha de *Rhizophora mangle* Cubatão, perto de Santos, Julho 1898. (Noack 55).

Um insecto só, da parte inferior da folha junto á nervura mediana.

♀ Elliptico, symetrico, chato, pardacento-escuro, um tanto lustroso; a superficie coberta de pequenas manchas asperas, a segmentação caracterisada por fortes rugas radiando do centro, long. 3 ½, lat. 3 mm.; a pelle depois de fervida em agua, d'uma côr parda, excepto nas bordas onde torna-se descorada; no dorso é fortemente tingida d'uma côr pardo-vermelha; não é dividida em laminas, mas os segmentos são indicados pelas rugas radiaes. A pelle da area dorsal e ao longo das rugas se acha de modo escasso coberta de orificios glandulares. A area sub-marginal, excepto nas rugas já mencionadas, se acha profusamente coberta de poros glandulares, grandes, redondos e arranjados em linhas mais ou menos radiaes. As laminas anaes são pequenas, juntas formando uma quadra. As partes bocaes são extremamente pequenas. A margem é provida

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de cabellos singelos, compridos e curtos, sendo os mais compridos um pouco inclinados a ter as pontas nodosas e tendo duas vezes o comprimento dos curtos.

As antennas têm 6 segmentos, sendo o terceiro muito mais comprido do que os outros, tendo quasi duas vezes o comprimento de 6 e mais ou menos o comprimento de 1, 2 e 4 juntos. Os segmentos são quasi iguaes, tendo o 5 exactamente a metade do comprimento de 2; sendo a formula 362145; alguns dos cabellos no segmento 6 são bem grossos. As pernas são bem desenvolvidas, mas a tibia e o tarso não são bem separados; a coxa é um pouco mais comprida do que a tibia; o femur é forte e o trochanter tem um comprimento quasi $^1/_6$ maior que o da tibia; o tarso é de cerca de $^5/_8$ do comprimento da tibia. A pinça é forte. As digitulas são regularmente fortes, as da pinça tendo um nó na extremidade; as do tarso têm mais de 2 vezes o comprimento da pinça.

L. rhizophorae se parece com o *L. tesselatum,* porem distingue-se delle por não ser tessellado (marchetado). Differe de *L. impar* pelo tamanho maior e pelos bem visiveis poros glandulares sub-marginaes. É tambem ligado ao *L. melaleucae* Maskell.

(4) *Aulacaspis boisduvalii* (Sign.) Ckll. var. *maculata,* v. nov. Achado nas folhas d'uma planta Lauracea em Campinas (Noack 69). Tanto os escudos ♂ como as ♀ têm as excuviae d'uma côr pardo-escura, tornando-se, as vezes, pallida. Os escudos ♂ em grande numero, agrupados em massas formam malhas, bem alvas e bem marcadas nas folhas, — as de ♀ são d'um amarello-chromatico tocadas d'uma matriz de côr laranja escura. A estructura geral é como a da *boisduvalii,* porém, com os lobos medianos muito estreitos e inteiros ou fracamente denticulados, o segundo e terceiro lobo são cadaum divididos em tres lobulos, como na variedade *tentaculatus* (Morgan), os do terceiro sendo bastante largos; um quarto lobo é representado por dois lobulos. Ha cinco grupos de glandulas circum-genitaes, sendo formado o mediano de 8 e 9, os

anteriores lateraes de 17 a 19 e os posteriores lateraes de 12 glandulas.

(5) *Chionaspis minor* Maskell. Na casca da *Melia azedarach,* Campinas (Noack 77). Uma variedade com o escudo mais largo e mais transluzento que do costume.

(6) *Pseudoparlatoria parlatorioides* (Comst.) Ckll. Na folha de *Drimys,* — uma variedade com mais glandulas nos grupos caudo-lateraes do que costuma haver; Morro Pellado (Noack 58). No lado inferior da folha duma planta myrtacea, Campinas, Setembro 1898 (Noack 85). Esta ultima collecção abrange as larvas recentamente fixadas, que estão cobertas no dorso e nos lados de filamentos felpudos que cobrem a superficie e fazem com que parece-se com as Aleurodidae. Estes filamentos que, na sua disposição, fazem lembrar da flôr de Chrysantemun, variedade com as petalas cumpridas e irregulares, ficam até o segundo periodo da vida, mas desapparecem inteiramente no adulto. Esta estructura é analoga á da *Greeniella corniger* (Green.), com a differença que os processos são fragis e rijos em vez de serem felpudos e filamentosos.

Esta larva é descripta agora pela primeira vez. Não posso comprehender porque não a tenho observada antes, pois têm passado pelas minhas mãos tantas amostras de *Pseudoparlatoria.* Sendo possivel que a tenho visto e confundida com os Aleurodes.

(7) *Fiorinia fioriniae* (Targ.) Ckll. Nas folhas da Hedera helix, Campinas (Noack. 76).

Mesilla Park., New Mexico (U. S. A.) 3 de Outubro de 1898.

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APR 19 1910
3.

Description of a Mexican Aleyrodes.

By T. D. A. Cockerell.

In Entomological News, 1903, I published a short note on *Aleyrodes vitrinellus,* a new species from Mexico. The full description was sent to Professor Herrera to publish in Mexico, but it was apparently mislaid or lost, as it has never appeared. It therefore seems necessary to give the particulars here, the original short note being inadequate. The species is of some importance just now, owing to the great attention being given to the Aleyrodidæ of *Citrus.*

Imago.—Yellow; eyes undivided; a bright orange stripe (apparently internal) extends from the posterior part of the thorax to about the middle of the abdomen.

Pupa.—Pale yellowish or colorless, very much like that of *A. floridensis,* but larger (900 μ. long; *floridensis* is not over 700 μ.), without the dark markings, and with a longer fringe, with more rods united, so that it seems coarser; the rods are straight. Surface of pupa strongly granular; margin double, one edge crenulated and the other (upper) one crowded with regular short tooth-like pointed projections; this is a condition very similar to that of *A floridensis.* There are more or less obvious dorsal and sub-dorsal longitudinal series of low tubercles. Margin with long radiating glass-like rods. No dorsal secretion.

Vasiform orifice about 54 μ. long, broad-cordiform, the apex (posterior end) very faintly notched; operculum very broad, the apical margin gently convex; lingua broad spatulate, the apical portion rather obscurely crenulate. In all this there is a general resemblance to these parts in *A. variabilis,* but in *A. vitrinellus* the vasiform orifice is much broader, with the apical notch very much fainter, and the operculum is very much less pointed, while the lingua is not so strongly crenulated.

Hab.—Garden of Netzahualcoyotl, Texcoco, Mexico (*A. L. Herrera,* No. 700). On the under side of leaves which appear to be those of orange, with much black fungus.

APR 19 1919
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[Reprinted from the JOURNAL OF ECONOMIC ENTOMOLOGY, Vol. 11, No. 2, 1918]

THE MOSQUITOES OF COLORADO

By T. D. A. COCKERELL, *University of Colorado*

More than a dozen years ago, when I was resident at Las Vegas, New Mexico, a prominent army medical officer appeared in town, to investigate the neighborhood as a possible site for a camp to which soldiers from the Philippines or the West Indies might be sent. The local merchants, always keen to extend their trade, wished to do everything possible to encourage the project. The officer, however, asked to see an entomologist, who might inform him whether *Anopheles* existed in the vicinity. I was accordingly called in, and testified that while I had met with *Anopheles* in the southern part of New Mexico, I had never seen any about Las Vegas. Scarcely had the officer departed, when I found *Anopheles* larvæ almost under the windows of the big sanitarium at Las Vegas Hot Springs. It was of course my duty to inform the army authorities, but I was rather relieved to hear that before my letter came it had been decided on quite other grounds not to place the camp at Las Vegas. The *Anopheles* was bred, and proved to be *A. pseudopunctipennis* Theob., quite new to that part of the world.

This year the same general problem presented itself in another form. In the course of the war, it will be necessary to establish a number of recuperation camps, and of course these must be situated in the most favorable localities. On account of frequent infection with tuberculosis, the drier regions of the west will prove especially beneficial. The malaria problem will be less important, but the absence of *Anopheles* is to be desired, to say the least. It will also be very desirable to place the camps reasonably close to commercial centers of distribution, so that food and other materials may be obtained without undue cost. On all these counts eastern Colorado, with portions of adjacent states, may be especially recommended. I mapped the recorded distribution of *Anopheles* from the data in the great work of Howard, Dyar and Knab, and found that the genus existed practically all over the United States, excepting apparently an area including eastern Colorado, Wyoming, Nebraska, the Dakotas, and some adjacent regions. It is not probable that *Anopheles* is actually absent from all this area, but even if locally present it can often be readily exterminated, owing to the limited possible breeding places. It was obvious, however, that our knowledge was extremely incomplete, and it seemed desirable to determine the actual facts relating not merely to *Anopheles*, but to the Culicidæ of the region generally. With this purpose in view, a mosquito survey of Colorado was begun this year. It was also planned to include Wyoming, from which it appeared that only one species (*Aedes nigromaculis*) was recorded, and collections were made in several localities. I recently learned, however, that Dr. John W. Scott and Mr. O'Roke of the University of Wyoming had taken up the Culicidæ of their state, and consequently we shall restrict ourselves to Colorado, merely presenting below the few Wyoming records already obtained. So far as recorded by Howard, Dyar and Knab, the Culicidæ of Colorado number seven species, referable to *Anopheles*, *Culex*, *Aedes* and *Theobaldia*. The material came from nine localities. Our own collections, prior to 1917, were of little value. During the past summer Professor Junius Henderson of the University of Colorado made two long trips in a Ford car, the first in Colorado, the second in Wyoming. On these journeys Culicidæ were collected whenever possible, and the collections thus obtained greatly extend our knowledge of distribution. The localities represented are as follows:

(A.) COLORADO (J. Henderson and P. Andrews).
  (1) *Eastern slope.*
    (a) Pueblo County. One mile east of Avondale, June 27; Boone, 4,477 ft. alt., June 28.
    (b) Chaffee County. River bottom 3 miles southwest of Salida, July 1; S. Cottonwood Canyon, west of Buena Vista, 8,500 ft., July 4.
    (c) Lake County. Upper Twin Lake, about 9,020 ft., July 5; two miles south of Leadville Junction, July 6. Seven miles south of Leadville, at 9,300 ft., July 8, *Prosimulium fulvum* (Coq.) was taken.
  (2) *Western slope.*
    (a) Eagle County. Two miles west of Tennessee Pass, July 9; four miles above Red Cliff, 8,850 ft., July 12; Cataract Creek, east fork of Eagle River, above Minturn, July 9; two miles above Minturn, at mouth of Cross Creek, July 14; four miles above Pando, east fork of Eagle River, July 10 (larvæ and pupæ); Wolcott, 6,965 ft., August 2; six miles above Wolcott, July 16; McCoy, August 4; creek

between Gypsum and Glenwood Springs, via Cottonwood Pass road, July 16.

(b) Pitkin County. One mile southwest of Aspen, July 22; Crystal River, one mile above Red Stone, July 27.

(c) Garfield County. Three or four miles above Carbondale, July 19; 13 miles above Glenwood Springs, on Grand River, August 2; 2½ miles north of Rifle, July 25.

(B.) WYOMING (J. Henderson and E. Schwabe).

(a) Bottom lands at Basin, August 29. *Aedes nigromaculis*, *A. curriei* and *A. vexans*.

(b) Box Elder Creek, 19 miles west of Douglas, August 25.

(c) Shell Creek, five miles above Shell, September 2. *Aedes vexans*.

(d) Dry mesa three miles north of Ten Sleep, August 28; Creek bottom three miles east of Ten Sleep.

(e) North Platte Bridge, about 8 miles northeast of Wheatland, August 24. *Aedes* in bad condition; one at least is *curriei*, some seem to be *vexans*.

On September 6, Dr. Chas. N. Meader kindly took me in his car to visit the localities occupied by troops in the vicinity of Denver. The following were examined with some care:

(a) Camp Baldwin. Could not find any species breeding, but in a dried up marsh, among tall reeds, were great quantities of mosquitoes. We caught ten females, and all were *Aedes vexans* (*sylvestris*), which did its best to justify its name.

(b) Fort Logan. Examined all pools by the river and pond near Fort, and obtained no culicids, larvæ or adults. The weather had been extremely dry, and the river had fallen, leaving many small pools, which were, however, full of fishes and frogs. We later learned that the pools about the camp had been oiled "every now and then" by the military authorities, but on September 6 we found little evidence of oil.

(c) Rifle range, near Golden. Could not find any species breeding. Caught a ♀ *Aedes vexans* and a male *Culex tarsalis*.

Our general impression was that Culicidæ were relatively scarce in the region, and where they occurred, they could very easily be dealt with. Another species, *Theobaldia inornata*, has been taken by Tucker at Denver.

Other collections were made at Boulder, Longmont and Brainerd Lake in Boulder County. On September 9 my wife and I examined Boulder Canyon from the mouth upward a distance of over three miles. The creek had fallen recently, and small pools were left, with very young fish in them. No culicids were found breeding, nor were any adults caught. Cattle at the mouth of the canyon had no culicids on them, but were plentifully infested by the horn-fly, *Hæmatobia serrata*.

The species so far definitely identified from Colorado or Wyoming are the following:

(1) *Anopheles quadrimaculatus* Say. Recorded only from the far western part of the state, at Hotchkiss and Delta in Delta County, where it was taken by G. P. Weldon, as is recorded by Howard, Dyar and Knab. We have so far found no trace of *Anopheles* in our collections. In the vicinity of Grand Junction, which is still nearer the western border, E. P. Taylor obtained four species of Culicidæ, but they were *Theobaldia incidens*, *Culex tarsalis*, *Aedes curriei* and *A. vexans*.

(2) *Culex tarsalis* Coq. Common at low altitudes, up to about 6,000 ft., but not in the high mountains. It is particularly abundant at Boulder, coming into the University buildings. It is the only mosquito at present recorded from Colorado Springs.

(3) *Culex pipiens* L. Recorded from Denver by Tucker in 1907, but the record needs confirmation. It was supposed to have been determined by Dyar, but Mr. Knab states that the determination must have been by Coquillett.

(4) *Theobaldia inornata* Willist. Common at Boulder; also collected at Denver and Florissant, and by Philip Andrews at mouth of Cross Creek, two miles above Minturn. The altitudinal range in Colorado is about 5,000–9,800 ft., so far as ascertained.

(5) *Theobaldia incidens* Thoms. Recorded from Grand Junction (E. P. Taylor), and Henderson and Andrews took it in S. Cottonwood Cañon, near Buena Vista. It is decidedly less common with us than *T. inornata*, and seems not to go so high in the mountains.

(6) *Aedes acrophilus* Dyar. Dr. Dyar has determined this from females and larvæ; the male is unknown. I had regarded the species as a new one near *pullatus*, but at the time the description of *acrophilus* (Ins. Ins. Mens. 1917, p. 127) from Alberta was being printed. Our localities are: females from a mile southwest of Aspen; S. Cottonwood Cañon, near Buena Vista; Cataract Creek, near Minturn; two miles west of Tennessee Pass. Larvæ from four miles above Pando, East Fork of Eagle River, July 10 (P. Andrews). It is a mountain species in Colorado, belonging especially to the Canadian Zone.

(7) *Aedes aldrichi* Dyar & Knab. Boulder (Cockerell); I determined it as *aldrichi*, and Dr. Dyar agrees.

(8) *Aedes cinereus* Meigen. One female taken by Schwabe and Henderson at Box Elder Creek, 19 miles west of Douglas, Wyoming. I took it for a new species, on account of the bright ferruginous thorax, with three very faint dorsal dusky stripes. Very possibly it represents a subspecies, but more material is needed. Dr. Dyar assures me that it has entirely the structure of *cinereus*, and cannot possibly represent a distinct species.

(9) *Aedes curriei* Coquillett. Common at lower altitudes in Colorado. Recorded from Grand Junction and Florissant, I have it from Boone, Boulder (it occurs on the University Campus), Grand R. above Glenwood Springs, Longmont, 2½ miles north of Rifle, and Wolcott. The specimens from Wolcott and thirteen miles above Greenwood Springs have very handsome markings, and represent the variety *mediolineata* Ludlow. In Wyoming *curriei* was taken in the bottom lands at Basin, and at the North Platte Bridge near Wheat-

land; var. *mediolineata* comes from the dry mesa three miles north of Ten Sleep. On the dry mesa near Ten Sleep the catch was 6 *curriei mediolineata* and one *vexans*, but in the creek bottom 7 *vexans* only. *A. curriei* goes to about 8,000 feet in dry localities, as at Florissant, but is absent from the Canadian zone.

(10) *Aedes idahoensis* Theob. Our form, referred to *idahoensis* by Dr. Dyar, has the abdomen banded, and looks distinct from the more typical form, with square black patches on abdomen, collected by Dyar in Montana. As we have neither males nor larvæ of the Colorado insect, the determination may be subject to revision. The localities are: three miles south west of Salida; one mile south west of Aspen; creek between Gypsum and Glenwood Springs (a small specimen); Upper Twin Lake; six miles above Wolcott; 3 or 4 miles above Carbondale; McCoy; two miles above Minturn. Several specimens from different places were examined by Dr. Dyar, and the others seem to me to be identical. I had first regarded the species as *A. hirsuteron*, which is very close to *idahoensis*, but the wing scales are not all black. In Colorado, *idahoensis* is of the Transition and Canadian zones.

(11) *Aedes mimesis* Dyar. I had regarded this as a new species; Dr. Dyar refers it to *mimesis*, described from Montana and British Columbia in Ins. Ins. Mens., 1917, p. 116. It comes from Upper Twin Lake, and four miles above Red Cliff (alt. 8,850 ft.); it is therefore a species of the higher mountains. There is a broad median brown band on thorax, in *curriei* style. The markings of the abdomen are variable.

(12) *Aedes nigromaculis* Ludlow. A species of the plains; recorded from Akron and Boulder. In Wyoming Henderson and Schwabe took it at Basin.

(13) *Aedes pullatus* Coquillett. A male which I collected at Estes Park Village (6,810 ft.), June 24, has been kindly examined by Dr. Dyar and found to be genuine *pullatus*.

(14) *Aedes sansoni* Dyar & Knab. I had determined this as *vittatus* Theob.; Dr. Dyar states that it is *sansoni*, and in Ins. Ins. Mens., 1917, p. 115, shows that *sansoni* and *vittatus* are the same. The name *vittatus* was published first, but it had earlier been used by Bigot for an insect which (as I learn from Dr. Dyar) Mr. F. W. Edwards now treats as a valid species of *Aedes*. *A. sansoni* is common in the Transition and Canadian Zones of Colorado: Boulder; S. Cottonwood Cañon near Buena Vista; two miles south of Leadville Junction; Crystal River near Red Stone (here also a small variety which looks distinct); three miles southwest of Salida; Upper Twin Lake. Prof. J. Henderson took it at 9,200 ft., southwest of Rabbit Ears, North Park, Colo., July 14, 1911, along with an *Aedes* with black tarsi and very long proboscis, not at present determined. A female which I collected at Estes Park Village, June 24, is said by Dr. Dyar to be near to or identical with *sansoni*.

(15) *Aedes stimulans* Walker. Recorded from Florissant, 1907 (Cockerell & Rohwer, on an old determination of Dr. Dyar's, when *sansoni* was not distinguished. It was presumably *sansoni*. I have, however, a very close relative of *stimulans* in a female from two miles above Minturn (P. Andrews). It is remarkable for the large palpi, and is certainly not *sansoni*. Dr. Dyar says it is new to him, but it is not described, as we have neither male nor larva.

(16) *Aedes triseriatus* Say var. *hendersoni* n. var. ♀. Dorsum of thorax anteriorly with at least lateral thirds covered with silvery scales; abdomen strongly purple, with the lateral white marks cuneiform, pointed mesad. 2 ♀. Box Elder Creek, 19 miles west of Douglas, Wyo., August 25, 1917 (Schwabe and Hen-

[illegible] Dr. Dy [illegible] silvery la [illegible] Maryland they ar [illegible] Th [illegible] and most [illegible]

[illegible] Very common at low [illegible] Boulder, Can [illegible] near Golden, Gra [illegible] of the Transition [illegible] In Wyoming, it was fou [illegible] being evidently

[illegible] specimens of A [illegible] may represent two or three additional spec [illegible] and these mostly in bad condition, [illegible]

I am indebted to [illegible] for assistance [illegible] who has sent me many [illegible] Had it not b [illegible] to wri [illegible]

[illegible] Prof. C. P. Gillett [illegible] Agricultural Colle [illegible]

derson), with *A. cinereus* and *A. vexans*. Comparing this with *A. triseriatus* from New Jersey and New York, I thought it distinct, but Dr. Dyar doubts whether it is worth naming as a race. Dr. Dyar observes, however, that in Montana also the *triseriatus* has the silvery lateral areas of mesonotum enlarged, while in Texas and Maryland they are narrow (typical *triseriatus*), and in Florida they are still more reduced. That is to say, the silvery areas are most developed in the arid west, and most reduced in the humid south.

(17) *Aedes vexans* Meigen. Very common at lower levels, as along the eastern foothills and adjacent plains. Boulder, Camp Baldwin, Denver, Boone, Grand Junction, Rifle Range near Golden, Grand River 13 miles above Glenwood Springs. It is a species of the Transition Zone with us, and is not found in the high mountains. In Wyoming, it was found at Basin, Box Elder Creek, Shell Creek and near Ten Sleep, being evidently as abundant as in Colorado.

We also have a series of specimens of *Aedes* with black tarsi, which may represent two or three additional species; but as we have only females, and these mostly in bad condition, nothing definite can be said about them.

I am indebted to Mr. F. Knab for assistance, but also and especially to Dr. H. G. Dyar, who has sent me many named specimens, and has examined all my puzzling forms. Had it not been for his kind assistance and advice, I could not have ventured to write this paper at the present time.[1]

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[1] Since the above was written, Prof. C. P. Gillette has very kindly loaned the Culicid collection of the Colorado Agricultural College. This will be reported on at a later date.

APR 19 1919
5.

Neocorynura, a Genus of Halictine Bees (Hym.).

By T. D. A. COCKERELL, Boulder, Colorado.

Schrottky proposed the name *Neocorynura* for *Cacosoma* F. Smith, preoccupied. The species are very numerous in Peru, and adjacent parts of Bolivia and Brazil; but they also extend as far north as Mexico, and the following form is to be added to that fauna:

Neocorynura discolor knabiana subsp. n.

♀.—Length about 8 mm., anterior wing 6.7 (true *discolor* 9 mm., wing 7.5 mm.); first abdominal segment reddish-black, brilliant green at sides and base; second segment with laterobasal corners bright green; third with a green basal band, covered with white tomentum. Antennae red at apex.

Cordoba, Vera Cruz, Mexico, January 20, 1908 (*F. Knab*), U. S. Nat. Museum.

Differs from typical *N. discolor*, as described by Smith, and again (from four examples collected by Sallé) by Vachal. in the green base of abdomen. The wings are greyish, with the marginal cell and beyond broadly fuliginous. This is also very near *N. chlorocion* (Vachal), but is easily separated by the black face. It is also related to *N. lignys* (Vachal), which Mr. Knab took at Cordoba on the same day.

The following key separates this from a series of Mexican and Central American specimens now before me, and records some new localities:

Abdomen elongated, distinctly claviform, segments 2 and 3 green at base; males. (Cordova, Mexico, May 10, *L. O. Howard*)*, *N. chlorocion* (Vachal)

Abdomen ordinary, or scarcely elongated; females.................1

1. First abdominal segment with very large coarse punctures; marginal cell and beyond fuscous (Tabernilla, Canal Zone, Panama, July, 1907, *Aug. Busck*) ....*N. cuprifrons* (F. Smith)

First abdominal segment not thus punctured....................2

2. Smaller; area of metathorax brilliant pale green, *N. discolor knabiana* Ckll.

Larger; area of metathorax not thus green...*N. lignys* (Vachal)

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* One of the *N. chlorocion* males carries two stylopids; this adds a genus to the list of those parasitized by Stylopids. The *N. chlorocion* have the wings appreciably dusky and the second abdominal segment quite closely punctured, but they are surely this species, which was originally recorded from Orizaba.

Probably one of these is *Rhopalictus chalcozonia* Sichel, of which Sichel said that he had a series from Mexico, but lacked time and space to describe it. Such time and space were never found, so far as I can discover, and the name remains nude. *Halictus konowi* Ducke is the same as *N. cuprifrons*, as Ducke himself stated. Smith, for no valid reason, described the insect as a *Megalopta,* so Ducke's mistake is not surprising. I have examined Smith's type.

From Chanchamayo, Peru (*Rosenberg*), the U. S. Nat. Museum has specimens of *N. lampter* (Vachal) and *N. lepidodes* (Vachal). The latter was described from Bolivia, and is new to Peru. I have one from Mapiri, Bolivia, sent by Schrottky.

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A New Genus of Bees from Peru (Hym.).

By T. D. A. Cockerell, Boulder, Colorado.

Among the Old World Halictine bees is a very singular genus, *Thrinchostoma* of Saussure; first described from Madagascar, but now known to be widely distributed in tropical Africa and Asia.* The species have the mouth region prolonged and more or less snout-like, the malar space large. The wings are hairy, and in the males there is a patch of black hair situated on the second transverso-cubital nervure. There is a hyaline fold or spurious vein extending from the base of the stigma obliquely across the first submarginal cell and across the lower part of the second. The abdomen is subclavate, especially in the males. The tongue is long and slender.

At Huascaray, Peru, September 21, 1911, Prof. C. H. T. Townsend collected a very peculiar bee, having the aspect of a male *Thrinchostoma,* but with slender simple hind legs, and no patch of black hair on the second transverso-cubital nervure. Closer inspection shows it to be a female, and as it is wholly without pollen-collecting apparatus it must be a parasitic insect. It is thus quite distinct from *Thrinchostoma* and it is an interesting question whether it represents an isolated group of an old Thrinchostomine stock, or an independent evolution of parallel characteristics. It represents in any event a genus new to our classification, though it has in fact been provided with a generic name. Vachal, in Miscellanea Entomologica, xii (1904), p. 127, described a species *Halictus chlerogas,* from a female taken at Callanga, Peru. It is considerably smaller than our species, and metallic green but it is evidently congeneric. Vachal, struck by its peculiar characters, surmises that it may represent a new parasitic genus and adds that if this should prove to be the case the genus might be named *Chlerogas,* and the species *C. latitans.* According to the rules, however, it will be *Chlerogas chlerogas* (Vachal).

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* See Canadian Entomologist, Feb., 1913, p. 35; July, 1915, p. 213. Ann. Mag. Nat. Hist., Dec., 1914, p. 452.

CHLEROGAS Vachal.

Halictine bees without pollen-collecting apparatus in the female, the abdomen of this sex clavate, truncate and hirsute at apex, without any caudal rima; hind legs of female long and slender, the tarsus much longer than tibia or femur; no hind patella; hind spur with three long teeth; head prolonged beyond the eyes, snout-like, malar space very large; inner orbital margins deeply emarginate; ocelli ordinary; antennae long for a female; scutellum binodose; wings conspicuously hairy; basal nervure falling short of transverso-median; second submarginal cell nearly square, first recurrent nervure meeting second transverso-cubital on entering extreme base of the large third submarginal cell; stigma large. Type *C. chlerogas,* but also includes:

Chlerogas hirsutipennis n. sp.

♀.—Length about 12 mm., anterior wing nearly 11; face prolonged about 1.3 mm. beyond eyes; head and thorax black, not metallic; labrum, mandibles and apical margin of clypeus dull yellow; clypeus dull with sparse very feeble punctures; antennae black, flagellum and apex of scape obscure, reddish beneath; face, vertex, mesothorax and scutellum with thin black hair; hair of metathorax thin, erect, ochreous; mesothorax dull, without evident punctures; area of metathorax with extremely fine oblique striae; posterior truncation of metathorax long, oblique, narrow, with a median sulcus, only the lower end defined on each side by a carina; tegulae dark reddish; wings dusky, stigma honey-color, nervures dilute fuscous; legs bright ferruginous; abdomen piceous above, dull, without bands, base of second segment pale reddish; apex with coarse black hair; second and third ventral segments light ferruginous.

Huascaray, Peru; type in U. S. Nat. Museum.

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Thorax short and broad, square, flat, densely gray pollinose on black ground, with distinct, close punctures which are not arranged in rows and bear only minute hairs, giving the mesonotum a bare appearance; the lateral setæ very short but stout; scutellum a little elongated, flat, punctured and concolorous with dorsum, with only one pair of apical setæ of noticeable size; pleuræ black, gray-pollinose except in the depressions above the front and hind coxæ; postnotum shining black; halteres yellow.

Abdomen subshining black above, indistinctly paler basally, opaque black below.

Legs including coxæ opaque black, the knees vaguely, the tibiæ except a broad, median ring on middle and hind ones, and all the tarsi yellow.

Wings subhyaline, veins blackish, the costal segment before the tip of second vein less than double the one beyond it.

Length 1.3 to 1.5 mm.

Thirteen specimens, both sexes: ten from Treesbank, Manitoba, May 6, 1916, including the type, a female; two Aweme, Manitoba, Sept. 12 and Oct. 13, 1916; one Estevan, Saskatchewan, May 20, 1916. All collected by Norman Criddle.

NEW HALICTINE BEES FROM CHILE.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The Chilean bee-fauna is one of the most remarkable in the world, many of the species having a facies quite distinct from those of other parts of South America. Many species were long ago described by Spinola; others have been made known at intervals since, but there can be no doubt that very many remain to be discovered.

Agapostemon (Pseudagapostemon) xanthorhinus, sp. n.

♂.—Length about 7.5 mm.; anterior wing 5.5; bluish-green; clypeus (except two dots and narrow lateral margins), labrum and mandibles (except black basal spot and ferruginous apex) yellow; a yellow stripe across tubercles; legs bright yellow, with the coxæ, trochanters, anterior femora basally, middle and hind femora largely behind (but not apically), piceous; clypeus produced, but ordinary; sides of face with dense, appressed, very pale yellowish hair; front dull and granular; antennæ long, the scape and two following joints yellow, the others pale ferruginous, the flagellum more or less dusky above, especially at base; fourth antennal joint about as long as second and third together; mesothorax and scutellum densely punctured but shining, with thin, rather long, pale hair; basal area of metathorax covered with coarse, vermiform rugæ; tegulæ pale, with a yellow spot; wings hyaline, stigma pale ferruginous, nervures testaceous; first recurrent nervure joining second submarginal cell beyond the middle; hind legs not modified; abdomen closely punctured but shining, with thin hair, but no bands; apical segment pale reddish, emarginate; venter mainly yellow, hind margin of fourth segment broadly W-like, the margins of the notch ferruginous.

Chile (E. C. Reed), U. S. Nat. Museum. Closely related to *A. citricarnis* (*Halictus citricarnis* Vachal), but that species differs by the somewhat greater size, the presence of yellow depressed hair on abdomen, the granular area of metathorax, the yellow antennæ, and the slightly emarginate fourth ventral segment. Also related to *A. paulista* (*Pseudagapostemon paulista* Schrott.), but differs in being smaller, with yellow mandibles. It has the clypeus yellow with two dots, as in *A. paulista*, not as in *A. nasua* (*Pseudagapostemon nasua* Schrott.). It does not seem advisable to regard *Pseudagapostemon* as more than a subgenus.

Rhopalictus corinogaster chilöeensis, subsp. n.

♀.—Wings dusky, nervures pale fuscous; tegulæ black, anteriorly margined with testaceous; legs and antennæ darker; abdomen darker red, first segment black except the broad, apical margin.

Island of Chilöe, Dec., 1894. Collector unknown. Type in my collection.

Rhopalictus callicladutus, sp. n.

♂.—Length about or nearly 9 mm.; head and thorax metallic green, with abundant white pubescence; labrum, mandibles and apex of clypeus pale testaceous; eyes deeply emarginate and strongly converging below; antennæ very long, the rather swollen scape black; the flagellum ferruginous, dusky above, strongly crenulate; front, sides of thorax and metathorax blue-green, but face, mesothorax and scutellum yellowish green; mesothorax finely punctured but moderately shining; area of metathorax with radiating plicæ, more or less connected by cross-ridges; tegulæ pale testaceous; wings ample, hyaline, stigma and nervures sepia; first recurrent nervure joining second submarginal cell very near end; tibiæ and tarsi, and much of apical part of femora, bright ferruginous, but femora otherwise green; abdomen clavate, long and slender, first segment swollen dorsally; first segment practically black above, second and third very bright ferruginous, fourth and fifth deep metallic green with hind margin red, apex red.

Chile (*E. C. Reed*), U. S. Nat. Museum. Easily known by the peculiarly coloured abdomen, but nearest to *R. corinogaster* (Spinola).

Rhopalictus melanocladus, sp. n.

♂.—Length about 8.5 mm.; head and thorax black, with white hair, the entirely dull and granular front, vertex, mesothorax and scutellum with a faint greenish tint; clypeus and labrum black, mandibles dark reddish beyond middle; eyes deeply marginate and strongly converging below; antennæ extremely long, black, the flagellum dark coffee-colour below, and strongly crenulate; area of metathorax strongly reticulate; tegulæ dark rufo-fuscous; wings brownish-hyaline, stigma and nervures dusky-ferruginous; second submarginal cell not very broad, receiving first recurrent nervure a short distance from its end; legs black, with the long tarsi; pale ferruginous; abdomen elongate, clavate, first segment swollen dorsally, but its apical part in a straight line with second (which is not true of *R. callicladurus*); abdomen black, with a very faint greenish tint, hind margins of segments obscurely reddish; apex pale ferruginous.

Chile (*E. C. Reed*), U. S. National Museum. Related to *R. chilensis* (Spin.), the type of the genus, but readily distinguished by the dark abdomen and the shape of the second submarginal cell.

AFRICAN BUPRESTIDÆ (COL.) OF THE GENUS STERNOCERA.

BY RICHARD T. GARNETT, BERKELEY, CAL.

The following table will separate the various forms of *Sternocera interrupta* Olivier:

I. Impressions of elytra present.
  A. Foveæ of thorax and elytra with white pilosity.
    B. Beneath dull bronze, above black; elytra black or dull castaneous, lighter punctured .... *S. interrupta* Olivier.
    BB. Entirely dull bronze; elytra rugose .... var. *reticulata* Kerremans.
  AA. Foveæ of thorax and elytra golden.
    B. Entirely bronze; base of abdominal segments metallic purple .... var. *klugi* J. Thomson.
    BB. Below golden green; elytra castaneous .... var. *mephisto* J. Thomson.
  AAA. Fovea of elytra red .... var. *vandykei*, subsp. nov.
II. Impressions of elytra absent .... var. *immaculata* Kerremans.

S. interrupta Olivier. Thorax entirely covered with irregular pits, smaller towards the middle and filled with white pubescence; beneath sombre bronze, above black, elytra black or sombre castaneous, more smoothly punctured. Elytra with 2 vittae at base on each side filled with white pilosity, the inner one small and short, the outer one long and broader and another on the elytral fold beneath the humeral umbone; posterior half of elytra with long vitta on each side filled with whitish pilosity, this vitta often broken up. Beneath rugose, entirely covered with the same white pubescence, except the median line where the pubescence is scanty or lacking altogether. Length: 27–42 mm. Width: 10–15 mm. Habitat: Damaraland; Senegal; Zambesi; Dakar.

Var. **reticulata** Kerremans. Entirely sombre bronze, metallic, with the elytra very strongly reticulate. Length: 26–35 mm. Width: 10–13.5 mm. Habitat: Senegal; Guinee.

Var. **klugi** Thompson. Fovea of thorax and elytra golden; entirely bronze; base of abdominal segments metallic purple. Length: 34 mm. Width: 13 mm. Habitat: White Nile; Senegal.

Var. **mephisto** Thomson. Fovea of thorax and elytra golden; Beneath golden green, shining; elytra castaneous.

Habitat: White Nile; Senegal; Benue; Niger.

Var. **vandykei** subsp. nov. The form, size, and punctuation are as in *S. interrupta* Olivier but the colouring is radically different from that of other varieties. Head and thorax the same as *interrupta*. Differs by having all the elytral impressions filled with red pilosity including the one below the humeral umbone; also by having a row of semi-triangular red spots on each side of the abdominal segments, those on the fourth and fifth segments largest, that on fifth running from top to bottom and from margin inwards from each side for 1/3 the width of the segment; segment 4 also has 2 extremely small more rounded spots in centre, not spaced evenly; the pilosity being otherwise normal and white. This variety is remarkable in that both red and white pilosity is present and the hairs of each colour are equally dense on the ventral surface of the abdomen. Length: 36 mm. Width: 14½ mm. Habitat: Bafulabe (Senegal). One specimen. Type in my collection.

Taken by W. F. Blakeslee. The specimen was sent to me loose and as a result it has lost 2 3/5 tarsi and 1 joint of an antenna. I take great pleasure in naming this after my friend and former teacher, Dr. Edwin C. Van Dyke of Berkeley, California.

Var. **immaculata** Kerremans. Impressions of elytra absent.

Stevensii and its one good variety may be separated as follows:

A. Thorax black; elytra castaneous..........*S. stevensii* Waterhouse.

AA. Thorax brassy; elytra very dark brown, with blue reflections..var. *waterhousei*, subsp. nov.

S. stevensii Waterhouse. For description of this and its variety I will quote Mr. Waterhouse in toto. "Resembles and is closely allied with *S. interrupta*, but it differs in the sculpture and ornamentation of the abdomen. Head and thorax black, with numerous moderately strong punctures and a median impressed line, all filled with whitish pubescence, as in *interrupta*. Each elytron with a small dirty white spot near the scutellum, an elongate spot in the middle of the base, a longer one below the shoulder, and a line behind the middle (near the side). Body beneath dark aeneous. Abdomen marked with punctures, each puncture bearing an obscurely brassy hair. These punctures are placed in groups of 2 or 3 or in undulating lines at the sides of the segments. On the 3rd and 4th segments these punctures are crowded together so as to form an undulating band, leaving a smooth shining spot on each side at the base, and a wide, triangular, sparingly punctured area in the middle. Punctures in the apical segment crowded together so as to form triangular patches on each side, leaving the middle space sparingly punctured." Length: 35 mm. Width: 13 mm. Habitat: West Africa; N. Nigeria.

Var. **waterhousei** subsp. nov. "Thorax brassy. Elytra very dark brown, with blue reflections." Habitat: Damaraland. Mr. C. O. Waterhouse in Ann. Mag. Nat. Hist. No. 82, p. 248 gave this variety without a name, and I have taken the liberty of affixing one to it, the characters given seeming sufficient to warrant it.

A GROUP OF AMERICAN HALICTINE BEES SIMULATING THE OLD-WORLD GENUS NOMIOIDES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The gaily-marked little Halictine bees of the genus *Nomioides* are widely distributed over the Old World, even extending to Australia (*N. perditellus* Ckll.). They are extraordinarily like our American species of *Perdita*, but structurally are so distinct that we can hardly suppose that there is any particular affinity. More recently, however, there has been found in South America a group of *Nomioides*-like insects which might almost be referred to the Old World genus, did they not possess a sharply pointed marginal cell as in *Halictus*. This affords another instance of similarity between neotropical and Old World insects, which may be due to common descent or to "convergent evolution," or to both. The group referred to, with ten described species, has been found in the Andean region, but it now appears that it extends northward to Panama. The following new species has been collected by Mr. Busck.

Halictus xanthinus, n. sp.

♀.—Length 5 mm. or a little over; head and thorax brilliant emerald green; mandibles pale yellow; clypeus ferruginous in middle and dusky reddish apically, but above and at sides green;

sides of face shining; inner orbits concave but not abruptly emarginate; scape long, black; flagellum dark above and ferruginous beneath; mesothorax dull and granular, with fine, very short, pale pruinose pubescence; tubercles yellow; tegulæ light fulvous; wings hyaline, nervures fuscous, outer nervures not weakened; first recurrent nervure joining extreme apex of second submarginal cell; area of metathorax large, microscopically reticulate, not plicate; legs pale yellowish or fulvous, the middle and hind tibiæ and tarsi fuscous, the middle tibiæ pale in front; hind spur with three very long spines; abdomen broad, smooth and shining, reddish fuscous and fulvous marked with lemon yellow; first segment broadly yellow basally and at sides except apically, where it is dark brown, but otherwise the segment is pale fulvous; second and third segments with a broad, yellow basal band, widest sublaterally, the segments otherwise fulvous in middle and dark brown laterally; fourth and fifth segments reddish-fuscous, with basal yellow bands; venter pale yellow, with the last three segments fuscous.

Porto Bello, Panama, March 13, 1911. (*Aug. Busck*), U. S. Nat. Museum. Nearest to the Brazilian *H. callichroma* (Ckll.), but with entire yellow bands on abdomen. The structure of the metathoracic enclosure is quite the same, with fine reticulations, the lines mostly transverse. Of the other species of the group, I possess *H. ephelix* Vach., from Marcapata, Peru; *H. phacodes* Vach., from Mapiri, Bolivia; and a cotype of *H. maculiventris* (Crawford), described under *Augochlora*. Crawford's species seems doubtfully distinct from *H. trinax* Vach., but I have no authentic material of the latter. Crawford and I, describing species of this group, have referred them to *Augochlora*. Vachal referred all the species to *Halictus*, but he included *Augochlora* in *Halictus*. Schrottky in 1910 placed the species in his genus *Nescorynura*. They are certainly not genuine *Augochlora*, nor do they agree well with typical *Nescorynura* or *Halictus*. They may be considered a distinct subgenus of *Halictus*, or even a separate genus. I do not propose a name, because it is possible that *Ctenocarynura* Schrottky (Deutsch. Ent. Zeit., 1914) is applicable. I have not been able to procure Schrottky's description, and there is no reference to the genus in the Zoological Record.

RECENT CANADIAN PUBLICATIONS.

Under this heading we propose to present notices from time to time of entomological publications by writers residing in Canada, or such as appear in Canadian periodicals, whether by Canadians or not. Exceptions will be made in the case of papers published in the Annual Reports of the Entomological Society of Ontario and the present journal. Short articles or those of a popular character will, as a rule, be merely listed.

Authors will greatly assist the Editor by sending him copies of their publications for notice in this section.

The following papers were all published during the present year:

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF NOVA SCOTIA FOR 1917. No. 3. Truro, January, 1918. Pp. 1–96.

This excellent report gives ample evidence of the vigorous condition of the youngest branch of our Society, and is a most creditable production. It contains no less than sixteen papers by ten contributors, dealing with a variety of subjects, both economic and faunistic, and these are illustrated by 15 plates, most of them half-tones of fine quality.

The following papers are mainly of economic interest:

Work of the Dominion Entomological Laboratory in Nova Scotia. By G. E. Sanders. An outline of the results of experiments testing the effects of different combinations of insecticides and fungicides in apple spraying.

Notes on the Yellow Leaf Hopper of the Birch (Oncopsis sobrius Walk.). By W. H. Brittain. The life-history is given in detail and is illustrated by two plates, showing all the stages, and the hymenopterous parasite, *Polynema striaticorne* Gir.

Miscellaneous Notes on the Apple Maggot. By. W. H. Brittain.
The Zebra Caterpillar. By H. G. Payne.
The Fall Cankerworm. By H. G. Payne.
The Rusty Tussock Moth. By H. G. Payne.
The White-marked Tussock Moth. By H. G. Payne.

Detailed life-histories of these four species are given, based on original data. They are illustrated by 5 excellent photographic plates.

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Reprinted from PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON
Vol. XVII, No. 1, 1915.

NOTES ON SOME BEES FROM VIRGINIA.

BY T. D. A. COCKERELL, *Boulder, Colorado.*

Mr. S. A. Rohwer has forwarded the following flower records referring to bees collected at Falls Church, Virginia. One of the females is undescribed and is herewith characterized.

VISITORS OF *Helianthus annuus coronatus.*

The following bees were taken collecting the pollen on the red sunflower:

Halictus ligatus Say. det. Crawford.

Bombus pennsylvanicus (De Geer) Franklin det. Crawford.

Bombus impatiens Cresson det. Crawford.

Melissodes dentiventris Smith det. Cockerell. Mr. Rohwer notes that this bee visits the sunflowers in the mornings; he never took it in the afternoon.

VISITORS OF *Phaseolus lunatus.*

The following two species are common visitors of the lima beans where they collect nectar:

Bombus pennsylvanicus (De Geer) Franklin det. Crawford.

Bombus fervidus Fabricius det. Crawford.

The following three species of *Megachile* collect pollen and are useful in cross fertilization. An especially important cross pollinator in the locality studied is the female described below.

Megachile exilis Cresson det. Cockerell.

Megachile latimanus Say det. Cockerell.

Megachile petulans Cresson.

Female. Length about 11.5 mm. Black, the tarsi slightly reddish at extreme apex, the flagellum with very obscure dark reddish spots on the joints beneath; hair of head and thorax black and white, the tuft behind wings cream-color; ventral scopa pale yellow, becoming white basally, black at extreme apex, but yellow on base of last segment; eyes dark (not green); cheeks and vertex small; vertex with black hair, clypeus with some black hair, front with black hair intermixed, face otherwise, and cheeks with white hair; clypeus and supraclypeal area shining, but closely and strongly punctured, no smooth median line on clypeus; lower edge of clypeus gently concave, with a very small median tubercle, not projecting below the margin; maxillary blades clear amber-color; first joint of labial palpi 1200 μ long, second, 975 μ, tongue extending about 1360 μ beyond labial palpi: mesothorax and scutellum densely punctured, but moderately shining between the punctures; discs of mesothorax and scutellum with black hair, but thin white hair on mesothorax anteriorly, white hair on scutellum posteriorly, and a band of dense white hair in scutello-mesothoracic suture; pleura covered with white hair; tegulæ black; wings dusky, especially apically; nervures dark; hair of legs mainly white, that on inner side of tarsi ferruginous; short joints of anterior tarsi thickened; middle and hind tarsi broadened, hind basitarsi very broad and flat; abdomen broad cordiform, shining, very finely punctured, with very narrow entire white hair-bands on hind margins of segments, that on first reduced to a fine ciliation except at sides; when the abdomen is seen from above, only a rather small amount of short black hair projects at sides; sixth dorsal segment in lateral profile short and straight, with thin black hair like that on fifth, though there is also a very delicate greyish pruinosity. Mandibles with two sharp teeth, a third truncate, and a long inner edge.

Habitat: East Falls Church, Virginia, at flowers of lima beans, along with *M. exilis* Cresson, ♂, and *M. latimanus* Say, ♀, August 9 (S. A. Rohwer). It is readily distinguished from *M. infragilis* Cresson by the 4-dentate mandibles (with the fourth or inner tooth not at all salient, merely a straight cutting edge), and the first joint of labial palpi longer than second. From *M. relativa* Cresson by the shape of the abdomen, band in scutello-mesothoracic suture, etc. From *M. mendica* Cresson by the black hair on dorsum of sixth abdominal segment, the entire bands, etc.

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Notes on some Heliothid Moths.

BY T. D. A. COCKERELL.

1. **Rhododipsa masoni** Smith.

Some years ago my wife collected specimens of this species at Boulder, Colorado, always on flowers of *Gaillardia aristata*. The moth rests on the flowers so that the red wings are on the red disc, and the yellow thorax is over the yellow rays, with the result that although the insect is brightly colored, it becomes practically invisible. I afterwards found that this habit was known to Mr. J. Mason, of Denver, and Professor Gillette. The type was, I believe, discovered through the picking of a *Gaillardia* flower.

2. **Lygranthoecia brevis** Grote.

At Boulder, on August 3, I noticed that this species rests upon the disc of *Helianthus lenticularis,* and is admirably protected in this position by its color. It seems to me very close to *R. masoni,* and I had taken it for a new form of *Rhododipsa,* but Dr. Dyar assures me that it is Grote's *brevis*. Holland's figure (Pl. xxvii, f. 40) is not much like my insect; Hampson's is better, but hardly characteristic, and as I was unable to identify my species from the works of these authors, I give a brief new description.

Expanse about 26 mm.; eyes large, rounded; prothorax with mainly yellow hair, almost entirely replaced on disc of thorax above with broad gray scales, having a more or less greenish lustre; behind this are large tufts of hairs which are broadly tipped with red; abdomen dark plumbeous with a metallic greenish and pinkish lustre, the apex broadly pinkish shading into orange at tip; anterior tibiae very short, three spurs on outer side, one near middle of apex, and mesad of that two large ones, also a small one on inner side higher up; pattern of anterior wings essentially as in *R. masoni*, but bright deep ferruginous taking the place of pink; antemedial line creamy white, with a short angular process, directed basad, in its lower part; median field with largely ochreous scales, but dark in region of stigmata; postmedian line broadly S-shaped; pattern of apical field, including checkered fringe, about as in *Pyrocleptria californica*. Posterior wings black with a white fringe; basal three-fifths of costa broadly pallid, the pale area squarely truncate at end. The moth carries pollen on its head, and undoubtedly assists in the pollination of the sunflower.

3. **Lygranthoecia mortua** Grote.

This extremely variable species abounds at Boulder during the first half of August, and is always found resting on the flower-discs of *Grindelia* where it is usually inconspicuous. The *packardii* (Grote) form appears to be the more normal one, but *mortua* proper also occurs, and there are other varieties. Possibly the series includes more than one species.

4. **Rhodophora gaurae** Sm. and Abb.

This beautiful species occurs in Boulder at light in July and August.

5. **Schinia hulstia** Tepper.

Taken at Boulder by Mr. S. A. Rohwer, and determined by Dr. Dyar.

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[Reprinted from TORREYA, Vol. 18, No. 8, Sept., 1918]

NOTES ON THE FLORA OF BOULDER OCUNTY, COLORADO

BY T. D. A. COCKERELL

The Flora of Boulder County has been recorded in a volume of 311 pages by Professor F. P. Daniels (Univ. of Missouri Studies, science series, vol. II, no. 2, 1911), who catalogues 486 genera and 1,225 species. Since the publication of this work about 27 genera and 76 species have been added, principally from the observations of Messrs. D. M. Andrews and E. Bethel. A few species have been deleted, but in round numbers the Boulder County list includes 1,300 species of flowering plants and pteridophytes. Comparing this with an area of similar size in Switzerland, we find a striking correspondence:

Boulder County. Area 751 square miles. 1,300 species.
Canton of St Gallen. Area 779 square miles. 1,295 species.

The Rocky Mountains are much more ancient than the Swiss alps, but this fact appears to have little or no influence on the composition of the present flora. The Swiss alps are heavily glaciated, while the Rocky mountains of Colorado are almost entirely bare; the mountains of Switzerland are also much more closely grazed than ours, and the lowlands are more extensively and intensively cultivated. These differences would lead us to expect a larger flora in a corresponding area in Colorado than in Switzerland.

In 1906 Rydberg recognized 2,912 species of seed plants and pteridophytes for the whole of Colorado; while in 1909 Schinz and Keller listed 2,460 for Switzerland, the area of which is of course much less.

The genera added to the Boulder County list are the following: *Thelypteris, Polystichum, Notholæna, Marsilea, Eriophorum, Veratrum, Kochia, Norta, Hoffmanseggia, Diholcos, Phaca, Hedysarum, Callirhoë, Pediocactus, Chamaepericlimenum, Oreoxis, Phellopterus, Cymopterus, Navarretia, Asperugo, Myzorrhiza, Cucurbita, Leucelene, Brauneria, Coreopsis, Pericome, Nabalus.* Several of these, as the *Kochia, Norta* and *Asperugo*, are introduced plants, foreign to the native flora. *Norta altissima* (L.) Britton is a remarkable case. I first collected it in Boulder in July, 1915; now it is everywhere, one of the most abundant weeds. It is also to be seen in other parts of the west, as along the Union Pacific Railroad. There is some confusion about the Linnean name and Bonnier calls the plant *Sisymbrium pannonicum* Jacq. The British "London Catalogue" also uses this name. But the singular thing is the contrast between its behavior in this country and in Europe. It has been introduced in the British Islands, but remains a rare straggler, not established. Gaston Bonnier says that it is not found at any great altitude in the mountains; in France it occurs here and there, very rarely; in Belgium it is rare, and inconstant in the localities where it occurs; it is very rare in Switzerland. Why, then, has it taken our country by storm? *Asperugo procumbens* L. I collected in Boulder, May 8, 1916; but it has not spread to any extent, so far as I have oberved. A very interesting escape is *Colutea arborescens* L. I recently saw it among a lot of wild flowers gathered by Miss Constance Fenton in Sunshine cañon. On making inquiry, I found that Mr. D. M. Andrews knew of more than one place near Boulder where it grew without cultivation, The Sunshine cañon locality was many years ago the abode of a solitary individual, who introduced various trees. Without attempting to review all the additions and changes in the list I note a few which seem of more general interest, or of which I have personal knowledge.

Quercus utahensis (A. D.C.) Rydb. Boulder (G. W. Letterman. 1854); Sargent, Trees and Shrubs, vol. 2. (1913), p. 222. It is safe to say that this species does not occur wild in Boulder County; there was probably some error in labelling. We have no native oaks.

Atriplex canescens (Pursh) Nutt. White Rocks, July, 1918, with galls of *Asphondylia neomexicana* Ckll. The White Rocks locality, northeast of Boulder, was botanically discovered by Mr. D. M. Andrews, who kindly took me over the ground. It is the type locality of *Asplenium andrewsii* Nels., which we saw growing on the face of the cliff. The White Rocks consist of Laramie sandstone, outcropping for a considerable distance along the creek, and possessing a flora which is, on the whole, very distinct from that of the surrounding country or the foothills. The fauna also doubtless differs. In my short visit I caught a southern bee, *Sphecodogastra texana* (Cresson) the genus and species new to Boulder County. The rocks are gay with *Helianthus petiolaris* Nutt. in July, and there is an abundance of *Prunus besseyi* Bailey with fine fruits.* Among the additions to the local flora discovered here by Mr. Andrews are *Abronia (Tripterocalyx) micrantha* Gray and *Rumex venosus* Pursh.

Another limited locality with a special flora is about four miles north of Boulder, on the road to Lyons, where the Niobrara shale outcrops. Here the specially characteristic plant, new to the local list, is *Delphinium geyeri* Greene. Here also is a quantity of *Hedysarum pabulare* Nels., also new to the list. These two very different and locally unique stations would well repay intensive study, which should if possible include the animals as well as the plants.

Aquilegia saximontana Rydb. has been found by Mr. Andrews above Silver Lake.

Camelina microcarpa Andrz. The weed now common in Boulder is not *C. sativa*, as reported, but *C. microcarpa*. Dr. Rydberg, to whom a specimen was sent, agrees. Bonnier treats *microcarpa* as a subspecies of *sativa*.

Rosa pratincola angustiarum Ckll. Mr. Andrews found this on Wood Mountain, Sept, 3, 1914, and I noted that the fruits

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*Mr D. M. Andrews has visited the exact locality of *Prunus prunella* Daniels, and finds the plants as described, but they are *P. besseyi*. W. F. Wight (Native American species of Prunus, p. 69) states that *P. prunella* is a form of *besseyi* with well marked leaf serrations. Rydberg, however, admits *P. prunella*, and places it in a different section from *P. besseyi*.

were dimorphic, depressed-globose or oblong. Where there are three fruits in a corymb, often two will be globose, with long peduncles, the third oblong. Some of the prickles are over 8 mm. long, and all are straight. I think this is a distinct species, *Rosa angustiarum.*

Rosa pratincola setulosa Ckll. will become *R. suffulta* f. *setulosa.*

Hoffmanseggia jamesii T. & G. was found by Mr. Andrews between Lafayette and Erie.

Aragallus. Our species are to be transferred to *Oxytropis,* and two new combinations appear to be necessary: *Oxytropis minor* (*Aragallus minor* (Gray) Ckll.), and *Oxytropis dispar* (*Aragallus dispar* Nels., *A. patens* Rydb.).

Viola Rafinesquii Greene is locally abundant at Boulder, but apparently has been introduced.

Pediocactus Simpsoni (Engelm.) Britt. & Rose is reported by Andrews from the high foothills north and south of Boulder, and the variety *minor* (*Echinocactus simpsoni minor* Engelm.) of the same from below Eldora.

Chamaenerion spicatum (Lam.) S. F. Gray f. *alba,* with white flowers, was found by me at Ward, 1917. The same variation (*alba* Hort..) is known in cultivation (cf. Standard Cyclop Horticulture).

Oenothera strigosa of the Boulder list is *O. cockerelli* de Vries.

Mertensia secundorum Ckll. does not seem to be the true *myosotifolia* Heller, from Red Cliff, nor can it well be *M. lateriflora* Greene, as Rydberg has it. I think it should be called *M. lanceolata* var. *secundorum.* The condition of affairs in the *M. lanceolata* group suggests the hybridization of two or more species, the ranges of which have come to overlap; but only experimental work can bring out the facts. Variability, with strongly heterozygous types, does not necessarily indicate hybridization; thus it exists in our district in *Ratibida columnifera,* which cannot well be suspected of any sort of bastardy.

Solanum elaeagnifolium Cav. was found by Andrews near Marshall; of course a stray.

Castilleja sessiliflora Pursh was collected at Boulder by Mr. E. Bethel, May, 1916. It has also been obtained since, and is locally common. It is not quite the same as the eastern plants the calyx being more deeply cleft above than below; it may be named var. or subsp. *betheli.* I consulted Mr. Osterhout about the matter, and he found the same character in other specimens from various Colorado localities; near Windsor, Weld Co., Livermore in Larimer Co., and Julesburg. On the other hand, one from Wray, Yuma Co., near the Kansas border, appears to agree with eastern specimens.

Helianthus grosseserratus of the Boulder list is *H. coloradensis* Ckll. I now have in the garden *H. parishii* Gray, obtained by Mr. Theodore Payne near Sevenoaks, in the San Bernardino mountains, California. To my surprise, it is nearly identical with *coloradensis.* The involucral bracts are shorter, and the leaves tend to be a little more distinctly dentate; but the plants are essentially of the same type, and there would be no serious objection to calling our plant *H. parishii coloradensis.** The Californian *parishii* grows taller, up to 15 feet. I thought this statement might be an exaggeration, but it is confirmed by Dr. H. M. Hall. The Californian plant also presents a more pubescent type, *H. parishii* f. *oliveri* (*H. oliveri* Gray), which seems to be wholly lacking in our region. It is perhaps related to a maritime environment. The *H. coloradensis* at Boulder has an additional color-form (f. *sulphurea,* nov.), with pale or sulphur-colored rays. It was found by Mr. Andrews. The color is the or (gold) of Gravereaux's color chart, while the typical form is his safran (saffron).

Gymnolomia multiflora (Nutt.) B. & H. Dr. S. F. Blake, in his admirable recent revision of *Viguiera,* shows that this plant is quite distinc tfrom the true *Gymnolomia.* It is the type of Nuttall's *Heliomeris,* but Dr. Blake refers it to *Viguiera,* where with its allies it constitutes a group or section, distinguished by the absence of pappus and other characters. It is said to be a compact group of closely related species, well distinguished by habit and involucre. The group of *Viguiera* proper from which it arose appears to be extinct. All this should indicate a valid genus, and to it may be added the fact that in caustic potash the rays of *H. multiflora* turn bright red on the basal half. This is the color-reaction of the perennial sunflowers, but is not exhibited by the type species of *Viguiera.* Dr. Blake, in his prefatory remarks (Revis. Viguiera, p. 3), strongly objects to the use of such chemical tests in taxonomic work with composites, but I do not see why they are not as significant as various morphological data. I never proposed to use them alone. He objects that they cannot mean much, since a variety of unrelated genera agreed in their reaction. In this criticism he overlooked the fact that they agreed only in *not producing any red color.* After stating any morphological generic character, it could be added that numerous unrelated forms agreed in *not* possessing it. It is worth while to realize, through chemical tests, that things are not always what they seem. Thus the pure white rays of *Leucampyx newberryi* turn bright yellow in caustic potash, whereas ordinary white flowers, devoid of pigment, are unaffected.

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*Gaston Bonnier in his Flora of France, Switzerland and Belgium, and Hooker, in his Flora of the British Islands, retain the binomials for all the subspecies or races, a plan which has some advantages over that of trinomials, though it is too easily a source of confusion. Presumably a citation of the aggreate species is not to be taken as indicating necessarily the typical race, unless followed by "typica," or "s. str." Some compromise is necessary for convenience, as any system of nomenclature which expresses the actual facts in detail becomes too combersome for general use. The objection to recognizing two grades of species, each with binomials, is not so serious when there is a standard Flora in which all are described.

The genus *Heliomeris,* limited and defined as a section by Blake, will stand as follows:

Heliomeris multiflora Nuttall.*

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* Since writing the above, I have been able to make new studies of *Heliomeris multiflora* at Peaceful Valley, Colorado, altitude 8,000 ft. This is well above the zone of *Helianthus,* which was represented only by a single small *H. annuus lenticularis,* from an accidentally dropped seed close to the store. The following characters should be added to descriptions of *H. multiflora.* Acuminate ends of disc-bracts bright yellow; the bracts otherwise pure white, with a light but bright green keel down the back; but the outermost ones are also profusely speckled on the back with black (anthocyanin). Stigmatic branches pure orange. Rays emarginate at end; ray florets wholly without pistils.

Mixed with the typical form was a very interesting mut. *Apicalis,* nov.; with the apical third of the rays at full maturity creamy-white, abruptly contrasting with the bright yellow basal two-thirds. When the flowers first come out, the apical part is yellow, but a shade paler than the rest. This is very significant in relation to the patterns in the rays of *Helianthus.* The species of *Rudbeckia* show

Heliomeris nevadensis (*Gymnolomia nevadensis* Nelson, 1904).
Heliomeris brevifolia (*Gymnolomia brevifolia* Greene, 1913).
Heliomeris longifolia (*Gymnolomia longifolia* Rob. & Greenm., 1899).
Heliomeris annua (*Gymnolomia multiflora annua* Jones, 1895).
Heliomeris hispida (*H. multiflora hispida* Gray, 1853).
Heliomeris hispida ciliata (*Gymnolomia hispida* var. *ciliata* Rob. & Greenm. 1899).
Heliomeris porteri (*Rudbeckia porteri* Gray; *Gymnolomia porteri* Gray).
Heliomeris obscura (*Gymnolomia obscura* Blake, 1916).
Arnica monocephala Rydb. becomes *A. pedunculata* Rydb. f. *monocephala*.

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white patches on the rays is fading, but these are irregular. In the palest forms of *Helianthus annuus* obtained by my wife in her cultures, the rays are at first light yellow throughout, but at full maturity are pale yellowish basally, shading into white apically; but the transition is not abrupt as in the *Heliomeris*.

The insect-visitors of *H. multiflora* were noted, and consisted of the following bees: *Bombus bifarius* Cresson, *Panurginus porteræ* Ckll., *Halictoides oryx* Vier., *Halictus cressoni* Rob., and the honey-bee; also the fly *Eristalis latifrons* Lev., and the plant-bug *Ligyrocoris contractus* Say. *Phacelia* and *Monarda* at the same place were visited by almost entirely different ~~sexes~~ species of bees, belonging to other genera in the main: e.g. *Anthophora* on *Monarda*, *Osmia* and *Anthidium* on *Phacelia*

Preoccupied Generic names of Coleoptera.

By T. D. A. Cockerell.

In the course of my work on the list of Coleoptera of New Mexico, I have been struck by the number of preoccupied generic names which are still allowed to stand in our catalogues. It occurred to me that it would be a useful service to make a complete list of these, and to this end I have examined every name given as valid in Henshaw's list, with respect to homonomy. As a result, I find nearly fifty names which are absolute homonyms, and a large number which differ from earlier named only in some minor feature (*e. g.* termination indicating gender), and would be considered homonyms by many. These latter should not, I think, be disturbed. I have not examined the names of the numerous genera described in recent years, since the publication of Henshaw's catalogue. In my manuscript, I have provided substitute names for nearly all the homonyms, but only part of them are given here, as although I have made much search for available synonyms myself, and the list has been kindly looked over by Mr. Fall, there is still a probability that several available substitute names will be discovered in the older literature. It is hoped that those who are aware of such will record them.

CARABIDÆ.

1. *Diplochelia* Brullé, 1835 (*Diplochila* of our lists), is *Rembus*, Latr., 1817. The latter name was alleged to be preoccupied, but apparently in error; hence it should be used for our species.
2. *Diaphorus* Dej., 1831 (not Meig., 1824).
3. *Euproctus* Sol., 1851 (not Gené., 1840).
4. *Nothopus* Lec., 1852, is *Euryderus* Lec., 1848, not *Eurydera* Lap. I do not consider these names the same, and think that *Euryderus* should be restored.

HYDROPHILIDÆ.

5. *Helopeltis* Horn, 1873 (not Signoret, 1858) = *Helopeltina* n. n.; species *Helopeltina larvalis* (Horn).

SILPHIDÆ.

6. *Pelates* Horn, 1880 (not Fisch, not Cuvier) = *Pelatines* n. n.; species *Pelatines latus* (Mann.).
7. *Aglyptus* Lec., 1866 (not Foerst, 1856) = *Aglyptinus* n. n.; species *Aglyptinus lævis* (Lec.).

STAPHYLINIDÆ.

8. *Polystoma* Steph., 1835 (not Zed., 1800); *Emplenota* Casey, 1884, is available.
8. *Tanygnathus* Er., 1837 (not Wagl., 1832).
10. *Trigonophorus* Nordm., 1837 (not Hope, 1831, not Steph., 1829).
11. *Megalops* Er. (not Lacép., 1803).
12. *Ephelis* Fauvel, 1883 (not Lederer, 1863) = *Ephelinus* n. n.; species *Ephelinius guttatus* (Lec.), *E. pallidus* (Lec.), *E. notatus* (Lec.).

TRICHOPTERYGIDÆ.

13. *Trichopteryx* Kirby, 1826 (not Huebner, 1816).

COCCINELLIDÆ.

14. *Megilla* Mulsant, 1851 (not Fabr., for a genus of bees). *Paranæmia* Casey, 1899, includes our *M. vittigera*.
15. *Mysia* Mulsant, 1846 (not Gray, 1840, or Brown, 1827). *Neomysia* Casey, 1888 (not *Neomysis* Czern., 1887), is available.

ENDOMYCHIDÆ.

16. *Symbiotes* Redt., 1858 (not Gerl., 1857). *Eponomastus* Buysson, 1891, is available; species *Eponomastus ulkei* (Cr.), *E. minor* (Cr.).

COLYDIIDÆ.

17. *Eudesma* Lec., 1863 (not Ehr., 1838) = *Eudesmula* n. n.; species *Eudesmula undulata* (Melsh.).

CUCUJIDÆ.

18. *Ino* Lap., 1835 (not Leach, 1819, not Oken, 1815).

CRYPTOPHAGIDÆ.

19. *Tomarus* Lec., 1861 (not Erichs, 1847).

DERMESTIDÆ.

20. *Acolpus* Jayne (not Brandt, 1835).

DASCYLLIDÆ.

21. *Allopogon* Horn., 1880 (not Schiner, 1866) = *Allopogonia* n. n.; species *Allopogonia villosa* (Horn).
22. *Aræopus* Lec., 1874 (not Spinola). I have not the exact date of the Spinolian name, but it is certainly older. The beetle-genus may be *Aræopidius* n. n.; species *Aræopidius monachus* (Lec)

ELATERIDÆ.

23. *Tharops* Lap., 1835 (not Huebner, 1816).
24. *Cryptostoma* Latr., 1825 (not Blainv., 1818) = *Palæoxenus* Horn.
25. *Asaphes* Kirby, 1837 (not Walker, 1834) = *Hemicrepidius* Germ.

THROSCIDÆ.

26. *Drapetes* Redt., 1849 (not Meg., 1821). There is also *Drapetis* Meig., 1822.

LAMPYRIDÆ.

27. *Cænia* Newman, 1838 (not Desv., 1830) = *Cæniella* n. n.; species *Cæniella dimidiata* (Fabr.), *C. amplicornis* (Lec.).

CLERIDÆ.

28. *Elasmocerus* Lec., 1849, is *Monophylla* Spin., 1841 (not *Monophyllus* Leach). If we accept the "one-letter rule" *Monophylla* should be restored.

PTINIDÆ.

29. *Theca* Muls., 1860 (not Sowerby, 1845). *Stagetus* Woll., 1861, is available; species *Stagetus profundus* (Lec.).

SCARABÆIDÆ.

30. *Bradycinetus* Horn., 1871 (not Sars, 1865) = *Bradycinetulus* n. n.; species *Bradycinetulus ferrugineus* (Beauv.), *B. fossator* (Hald.), *B. serratus* Lec.), *B. horni* (Rivers).

CERAMBYCIDÆ.

31. *Eustroma* Lec., 1873 (not Hubner) = *Eustromula* n. n.; species *Eustromula valida* (Lec.).
32. *Æthecerus* Chevr., 1862 (not Wesm., 1845).

CHRYSOMELIDÆ.

33. *Monachus* Chevr., 1834 (not Kaup, 1829).

TENEBRIONIDÆ.

34. *Cnemodus* Horn., 1870 (not Schaeff., 1850) = *Cnemodinus* n. n.; species *Cnemodinus testaceus* (Horn).
35. *Noserus* Lec., 1862 (not Foerst, 1862; not *Noserius* Pascoe, 1857.)
36. *Eupsophus* Horn., 1870 (not Fitzinger, date uncertain, but much earlier) = *Eupsophulus* n. n.; species *Eupsophulus castaneus* (Horn).
37. *Aphanotus* Lec., 1862 (not Lowe, doubtless earlier).

ÆGIALITIDÆ.

38. *Ægialites* Mann. (not Boie, 1822).

OTHNIIDÆ.

39. *Othnius* Lec., 1861, is *Elacatis* Pascoe, 1860. The latter was "preoccupied" by *Elacate* Cuvier, and should I think be restored. The family, however, cannot be called Elacatidæ, because *Elacate* is the type of a family Elacatidæ, in fishes.

MELANDRYIDÆ.

40. *Carebara* Lec., 1862 (not Westw., 1841) = *Rushia* Forel, 1893; species *Rushia longula* (Lec.).

MELOIDÆ.

Zonoitoides Fairm., 1883 (not American) is a homonym of *Zonitoides* Lehm., 1862.

OTIORHYNCHIDÆ.

41. *Rhypodes* Horn, 1876 (not Stal, 1874) = *Rhypodillus* n. n.; species *Rhypodillus dilatatus* (Horn), *R. brevicollis* (Horn).

CURCULIONIDÆ.

42. *Triglyphus* Lec., 1876 (not Loew, 1840) = *Triglyphulus* n. n.; species *Triglyphulus ater* (Lec.).
43. *Macrops* Kirby, 1837 (not Burm., 1835, or Wagl., 1830) = *Hyperodes* Jek., 1864; species *Hyperodes vittaticollis* (Kirby), *H. humilis* (Gyll.), *H. hirtellus* (Dietz), *H. wickhami* (Dietz), *H. sparsus* (Say), etc.
44. *Eudocimus* Schonh., 1836 (not Wagl., 1832).
45. *Coelogaster* Schonh., 1837 (not Schrank, 1780). Two other homonyms are *Coelogaster* Ashmead, 1893, and *Coelogaster* Schulze, 1896.
46. *Plocamus* Lec., 1876 (not Dejean, 1834).

CALANDRIDÆ.

47. *Himatium* Woll., 1873 (not Clark, 1860) = *Himatinum* n. n.; species *Himatinum errans* (Lec.), *H. conicum* (Lec.), *H. nigritulum* (Casey).
48. *Wollastonia* Horn, 1872 (not Heer, 1852) = *Wollastoniella* n. n.; species *Wollastoniella quercicola* (Boh.).

ANTHRIBIDÆ.

49. *Ischnocerus* 1839 (not Grav., 1829).
50. *Phœnicobius* Lec., 1876 (not Morch, 1852) = *Phœnicobiella* n. n.; species *Phœnicobiella chamœropis* (Lec.).

It is greatly to be hoped that the "one-letter rule" will prevail; that is to say, that no name will be considered a homonym unless preoccupied by one spelled in exactly the same way. It necessarily goes with this, that the spelling of names must never be changed from the original, except in the case of a misprint. There are many names in our list of Coleoptera which have been so changed, and they should, I believe, all be restored to the original form. To give some idea of the disaster that will result from the interpretation of homonymy which is prevalent in certain quarters,* I will cite some of the Coleopterous names which would fall.

Agraphus Schonh, 1834,	not	*Agrapha* Hubn., 1816.
Amblychelia Say, 1834,	"	*Amblychilus* Fisch., 1813.
Amphicerus Lec., 1861,	"	*Amphiceras* Gray, 1847.
Aphorista Gohr., 1873,	"	*Aphoristia* Kaup., 1858.
Aplastus Lec., 1859,	"	*Aplasta* Hubn., 1816, or Schaum, 1844.
Arhopalus Serv., 1834,	"	*Arhopala* Boisd., 1832.
Asemum Esch., 1830,	"	*Asemus* Ranz., 1820.
Atimia Hald., 1847,	"	*Atimus* Dejean.
Chromatia Lec., 1862,	"	*Chromatium* Perty, 1852.
Chrysophana Lec., 1859,	"	*Chrysophanus* Hubn., 1816.
Coenonycha Horn., 1876,	"	*Coenonica* Kraatz, 1857.
Colastus Erichs, 1843,	"	*Colastes* Hal., 1833.
Conoecus Horn,	"	*Conoeca* Scott, 1865.
Dromius Bon., 1813,	"	*Dromia* Fabr., 1798.
Euphoria Burm., 1842,	"	*Euphorus* Nees, 1834.
Polyphylla Harr., 1841,	"	*Polyphyllia*, 2 and 9, 1833.

In the case of the following, I do not know which has priority:

Morio Latr., 1810 (Coleop.) and *Morio* Month, 1810 (Mollusca).
Cyllene Newman, 1840 (Coleop.) and *Cyllene* Gray, 1840 (Mollusca).

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* For a discussion of this matter, see Palmer, Index Generum Mammalium, pp. 34-37.

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BULLETIN
OF THE
Southern California Academy of Sciences

VOL. 3. LOS ANGELES, CAL., JAN. 1, 1904. NO. 1

Quercus Wislizeni in Southern California.

BY LEROY ABRAMS.

In a former article in this publication (I:89, 1902) I had occasion to mention the occurrence of **Quercus Wislizeni** A. DC. in Southern California. Since then Mr. Parish in a later number of this publication (II:11, 1903) doubts the determination of my specimens, at least as far as the plants from San Bernardino Mountains are concerned. He says: "I have been unable to detect it in the San Bernardino Mountains, and specimens from that station with which Mr. Abrams has obliged me, while indecisive, appear rather to belong to **Q. dumosa,** the common scrub oak of the region." That this species should be confused with **Q. dumosa** can hardly be understood for they have nothing in common save that both, in our region, are shrubby. This confusion seems to exist, however, and for that reason it may be proper to point out some of the differences. The leaves of **Q. dumosa,** as it is now understood, are variable, but they are usually blunt and more or less short pubescent and grayish beneath, while those of **Q. Wislizeni** are usually pointed, a bright, glossy green and smooth on both surfaces. These characters make them easily distinguished in the sterile condition. In the fruit the characters are still more pronounced. **Q. dumosa,** being a white oak, has usually blunt acorns and more or less tuberculate cups, caused by the thickened scales. **Q. Wislizeni,** on the other hand, is a black oak and has pointed acorns and deep cups composed of thin scales, much resembling those of the well-known **Q. agrifolia,** to which species it is much more nearly related. This can be distinguished from both **Q. dumosa** and **Q. agrifolia**, however, in that it develops the fruit the second year while they mature theirs the first. Some do not seem able to detect this fact unless they find the fruit and undeveloped ovules on the same twig, a circumstance seldom met with, for only the most vigorous twigs develop fruit two years in succession, but when it is known that the flowers appear on the young shoots in the spring, it goes without saying that, when the fruit develops the first year, it will be found on the twigs of the same season's growth, while those that develop the second year will be found on last year's twigs. Knowing this, it can, in nearly every case, be easily learned which year the fruit develops.

Upon the re-examination of my material I became convinced that my determinations alluded to above were correct and that these plants agree well with those from the more northern part of the state, and in addition to my former material, I have had the advantage of another season's collecting and am enabled to extend the range still further. Besides this material I have had the privilege of examining that in the following herbaria: Brandegee, Parish, California Academy of Sciences and Stanford University, in all of which I found more or less from our range. I give below a list of the specimens I examined, which were collected below the Tehachapi, including the collector and the herbarium in which the specimens are to be found:

Cuddy's Ranch, near Gormans Station. **Dudley,** No. 4366. (S. U.)

Kings Canyon, Sierra Liebre Mts. **Dudley,** No. 4346. (S. U.)

Mt. Lowe, **Dudley,** July 20, 1899. (S. U.)

Mt. Wilson. **Abrams,** No. 1518. (Abrams, S. U.)

Lytle Creek Canyon. **Hall,** No. 901. (S. U.)

Santa Inez Mountains. **Franceschi,** 1894. (Brandegee.)

Mt. Lowe. **Kinney,** September, 1902. (Parish.)

Arrowhead Grade, San Bernardino Mountains. **Shaw,** August, 1900. (Parish, Abrams.)

Santa Ana Canyon, San Bernardino Mountains. **Shaw,** August, 1900. (Abrams.)

Spencer Valley, San Diego County. **Abrams,** No. 3875. (Abrams, S. U.)

Cuyamaca Mountain. **Abrams,** No. 3950. (Abrams, S. U.)

Walker's Ranch, near Jacumba. **Abrams** No. 3697. (Abrams, S. U.)

San Pedro Martir, Lower California. **Brandegee.** (Cal. Academy.)

Stanford University.

12

The Bees of Southern California.—1.

BY T. D. A. COCKERELL.

The series of articles to appear under the above title will contain descriptions and records of Southern California bees, and it is hoped eventually to publish tables for the identification of all the species.

Stelis laticincta, Cresson.

Wilson's Peak, one male, collected by Dr. Davidson.

Only the female has been described. The male is similar, but only 6 mm. long, with the clypeus, a small supraclypeal mark, and a line beneath anterior ocellus, all yellow, in addition to the markings present in the female. The yellow stripes behind the eyes are continuous right across the top of the head. The anterior and hind tibiae are yellow on the outer side.

While working up the present insect I have become satisfied that the New Mexico insect which has passed for years as **S. costalis**, is quite distinct. It is to be said that Mr. Fox long ago compared it with Cresson's types, and did not think it was **costalis**. It may be known as **S. rudbeckiarum**, n. sp., the type being my No. 1567, Santa Fe, July, at flowers of **Rudbeckia.** It is about 7 mm. long, varying to 5½, and the male agrees with Cresson's description of female **costalis**, except in the following character: Tubercles and pleura wholly black tegulae ferruginous, with a yellowish spot anteriorly; legs black, the knees broadly and the tarsi red, the hind femora have a good deal of red, and the tibiae show a little reddish on the inner side; yellow band on third abdominal segment not indented. The clypeus is entirely black.

Dianthidium.

Four species of this genus have been collected in Southern California. In the following table they are separated and compared with several species found elsewhere.

Scutellum all black in both sexes; size large (Europe).. ....**septemdentatum** (Latr.)

Scutellum with at least some yellow or whitish; size smaller 1

1. Small, compact species, with the hind edge of the scutellum produced and sharp-edged, the yellow marks on scutellum in a straight line or almost so; posterior coxae without spines. (**Anthidiellum**, n. subg., type **strigatum**) 2

Not so; scutellum less produced, the yellow marks or band on scutellum not in a straight line.............. 5.

2. Band on second abdominal segment nearly as widely interrupted as that on first, i. e., reduced to lateral marks (Europe)....................**strigatum** (Panzer).
Band on first adbdominal segment reduced to lateral marks, but that on second at most very narrowly interrupted....................................... 3.

3. Hind tibia without black (New Mexico)....**gilense** (Ckll.)
Hind tibia with a good deal of black.................. 4.

4. End of male abdomen with four little teeth; band on second abdominal segment very broadly interrupted (Mojave Desert ....**ehrhorni** (Ckll.)
End of male abdomen without such teeth; band on second abdominal segment very narrowly interrupted (Southern California)...............**robertsoni** (Ckll.)

5. Yellow band on first abdominal segment broadly interrupted in the middle (New Mexico)....**perpictum** (Ckll.)
Band on first abdominal segment entire in the middle, interrupted, if at all, at the sides.................. 6.

6. Base of abdomen with a good deal of red (Georgia, Texas, New Mexico, etc...............**curvatum** (Smith.)
Base of abdomen without red...................... 7.

7. End of male abdomen strongly trilobed; male with no supraclypeal mark; markings of abdomen chrome yellow in both sexes (So. California)......**consimile** (Ashm.)
End of male abdomen truncate, faintly trilobed; male with a small supraclypeal mark.................. 8.

8. Markings of abdomen pale yellow, bands more incised laterally (New Mexico, Colorado).......**parvum** (Cress.)
Markings of abdomen bright yellow, bands less incised laterally (Southern California)........**davidsoni** (Ckll.)

Dianthidium robertsoni, n. sp.

Four specimens collected by Dr. Davidson, three from Rock Creek, one from Los Angeles. Named after Mr. Charles Robertson, who first pointed out the presence of pulvilli in the genus. Small and compact, 5½ to 7 mm. long, the larger being females; black, with chrome yellow markings, strongly punctured; apex and apical half of costa of wings broadly fuliginous, the whole of the marginal and nearly all of the submarginal cells dark; the only yellow marks on head in the female are the large cuneiform lateral face-marks, and the entire occipital band, but in the male the clypeus and two triangles occupying the corners of the supraclypeal area and touching or almost touching medially are light yellow; markings of thorax and abdomen as in **D. gilense,** except that the anterolateral stripes on margin of mesothorax are not bent posteriorly, the anterolateral spots on scutellum are wanting, the abdominal bands on the third and following segments are somewhat more widely interrupted, and are laterally very deeply incised or divided altogether, those on four and five always being divided; the sixth segment has much black, being in the female black with two yellow marks, and in the male usually yellow with a reversed black T; ventral scopa white; legs in female black, the apices of femora, tibiae and tarsi ferruginous; anterior tibae with more than the basal half yellow outside, middle tibiae all yellow outside, hind tibiae with a yellow basal spot; in the male the anterior and middle legs are strongly bearded with long white hair, the anterior tibiae are yellow outwardly and pale reddish within, the middle tibiae are yellow with a very large black spot on the outer surface and a similar reddish one on the inner, and the hind tibiae are black with the ends broadly yellow, the tarsi have the basal joint yellow and the small joints ferruginous; the apex of the male abdomen is truncate with a faint trilobation.

Dianthidium consimile (Ashmead.)

Dr. Davidson sends me three collected at Los Angeles; they bear dates June 13 and 15. I have identified the species from Ashmead's description, but I find that this, although stated to be that of a female, accords with the male of the insect before me. In the female the clypeus is black in the middle and yellow only at the sides. Except for this discrepancy the description applies excellently. The yellow tooth or spine on the hind coxae is very small in the female, somewhat larger in the male.

Dianthidium davidsoni, n. sp.

Two males collected by Dr. Davidson at Bear Valley, California.

Length 8 to 9 mm.; black with bright chrome yellow markings. In structure and markings similar to **D. parvum,** but larger, with the yellow much brighter, and the abdominal bands much less incised. The pubescence of the upper part of the head and thorax has a yellowish tint. Apical segment of abdomen yellow, truncate and faintly trilobed, only its extreme base, where it is overlapped by the penultimate segment, is black; penultimate segment yellow except the overlapped base, a median basal pointed process, and two transverse subapical marks (in **parvum** it is black with two light yellow crescents joining medially); first recurrent nervure about as far from base of second submarginal cell as the second is beyond its apex; yellow spines of hind coxae very large; pleura with or without a small yellow spot.

The following species, hitherto placed in **Anthidium,** must be transferred to **Dianthidium, D. formosum** (Cress.), **D. gabbi**

((Cress.), **D. mexicanum** (Cress.), **D. apicale** (Cress.), **D. bivittatum** (Cress.), **D. toltecum** (Cress.), **D. agnatum** (Cress.), **D. texanum** (Cress.), **D. ulkei** (Cress.), **D. cressonii** (Dalla Terre, **D. lepidum** (Cress.), **D. simile,** (Cress.), **D. concinnum** (Cress.), **D. pudens** (Cress). The easiest way to distinguish **Dianthidium** from **Anthidium** is to notice the little pulvillus or pad between the claws, this being absent in the latter genus. **Stelis** looks like **Dianthidium,** but it is a parasitic bee, and consequently the female has no scopa for holding pollen. ” ” ,

The species of **Dianthidium** are "resiniers," making resin nests; **Anthidium** lines its nest with cottony fibers.

Prehistoric California.

(Continued from December BULLETIN.)

BY DR. LORENZO GORDIN YATES.

WHALE.

Fossil remains of whales have been found at many localities, mostly near the coast. One of these found in the Plicoene ? near Santa Barbara by Professor George Davidson was named by Professor Cope, who called it **Eschrichtius Davidsoni.** It was as large as the "California Gray Whale," but belonged to the "Finbacks."

THE HOG.

Elotherium imperator, Leidy, from the Miocene at Douglas Flat, Calaveras county, under the lava, is described as allied to the hog.

SLOTH.

Professor Cope named an animal found in Quaternary of the Klamath River, at Yreka, the **Moritherium giganteum.** It was an extinct Sloth, and is supposed to have made the tracks resemblinggigantic footprints found in the Carson Quarry in Nevada.

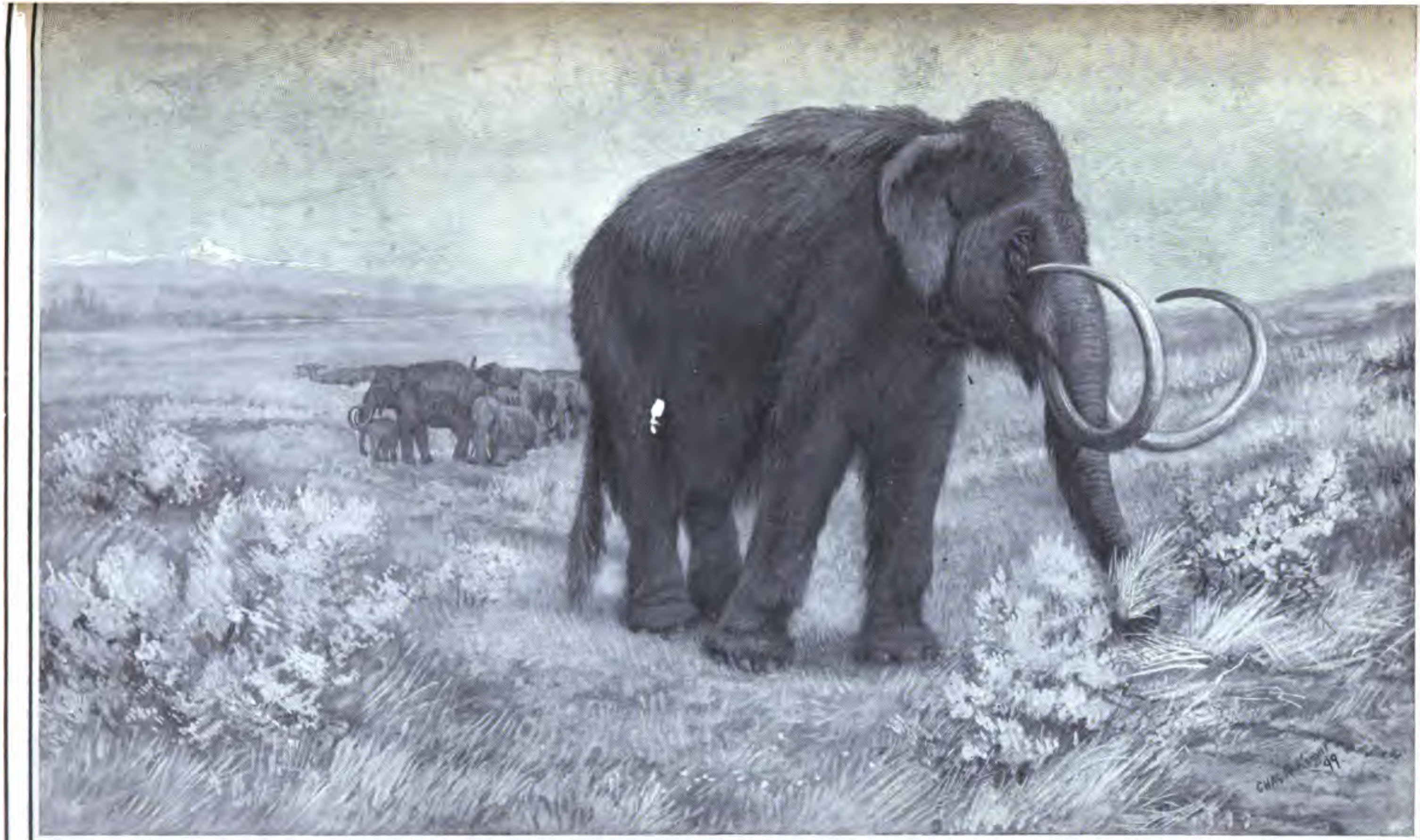
Professor Cope named an animal found in the Quaternary of the Klamath River, at Yreka, the Moritherium giganteum. It was an extinct Sloth, and is supposed to have made the tracks resembling gigantic human footprints found in the Carson Quarry in Nevada.

TAPIR.

The South American Tapir is represented by fossils found in the Auriferous Gravel, above the lava, in Tuolumne county.

BEAVER.

A fossil rodent, **Sigmogomphius Le Contei,** Merriam, named for the late Professor Joseph Le Conte, was found by Professor



MAMMOTH (Elephas primigenius)

Copyright, 1899, by S. S. McClure Co.   Reproduction of a painting by C. R. Knight for McClure's Magazine   Courtesy The U. S. National Museum

John C. Merriam of the University of California in the lower deposits of the Pliocene, near Berkeley, in fresh water beds.*

The writer found skulls of the Beaver (Castor fiber ?) in the marshy banks of the San Joaquin River above Antioch. These have not been subjected to critical examination.

NON-MAMMALIAN VERTEBRATES.

Sharks.

Numerous species of fossil sharks have been found in California, notably in Kern county, where ten of the species described by Agassiz have been recognized.

(Numerous specimens of the teeth and bones of vertebrates found in the Quaternary by the writer have not, as yet, been determined.)

In Volume XXIV. of the "Proceedings of the United States National Museum, Washington, 1902," Dr. Frederic A. Lucas has described "A Flightless Auk, **Mancalla Californiensis, from** the Miocene of California."

The genus was founded upon "a nearly complete left humerus found in excavating Third street tunnel at Los Angeles, California, in strata considered by Mr. W. H. Dall as belonging to the Upper Miocene or Lower Pliocene, probably the former."

It is probable, as Professor Whitney and Dr. Cooper suggested, that the fragmentary bones and teeth of many of the extinct mammals which have been found in the Quaternary of California are portions of animals inhabiting California during the Miocene and Pliocene periods, and that during some of the great changes resulting from the erosion and detrition caused by the local elevations and depressions of the surface they were weathered out and transported to distant localities by the rush of waters over their original place of deposit, and were again buried in the debris of later epochs.

All of the fossil remains of the before mentioned animals, which the writer has found in undoubted Quaternary deposits, indicate that the bones had been thus distributed.

Some of those found in the Pliocene may have been originally deposited in Miocene formations. In one instance the writer found in the bed of Alameda Creek, near Niles, Alameda County, a boulder of very hard, coarse conglomerate in which was imbedded a perfect molar tooth of a mastodon. The boulder was undoubtedly a portion of a Pliocene deposit, some miles distant, and had been rounded off by the combined action of water and the friction of other rocks during its rough journey in the rocky bed of the present creek, and had it not been for the material in which it was imbedded being easily recognizable, it would have been referred to the Quaternary. We will go still further back in its history. The tooth was nearly perfect and had been but little worn, showing that it had not been shed during the lifetime of the animal, and not being connected with any other portion of the skeleton, it may have belonged to an animal of the Miocene Period, whose remains were imbedded in the deposits of that period, and had been exposed and subsequently separated from the other portions of the skeletion by the action of the elements and again deposited in one of the "Dead Rivers" of the Pliocene Period, to be again disentombed and removed after the lapse of many thousands of years.

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* Bulletin of the Department of Geology, University of California, Vol. I, No. 13, 1896.

Had this tooth been covered up and left where the writer found it (in close proximity to an Indian Rancheria), it might after other thousands of years, have been discovered by some future scientist and been considered satisfactory proof of the contemporaneity of man and the Mastodon.

Such instances show the necessity of close study, careful discrimination and conservative deductions in an attempt to read detailed history from the Book of Nature.

THE LENGTH OF GEOLOGIC TIME.

For the benefit of those who have not given much thought to the subject of the Earth's age the following estimates made by eminent geologists and physicists are given. Those of the geologists are based upon the present rate of deposit of marine sediment, and the destruction of land by erosion and denudation, compared with the total thickness of sedimentary rocks. The correctness of the estimates—provided that the rates have been always uniform—is evident, but in the absence of that assurance the conclusions are uncertain and elusive.

The estimates of the physicists are based upon the application of the laws of heat radiation, and their conclusions have materially modified the former theory, that for the deposition or formation of the sedimentary rocks a minimum of hundreds of millions of years were required, and for the time which elapsed since the earth was in a molten state no limit could be given.

Mr. Clarence King, a former United States Geologist, as the result of experiments upon the behavior of certain rocks under conditions of heat and pressure, came to the conclusion that it cannot be more than twenty-four million years since the earth was in a molten state or condition.

Mr. Warren Upham gives forty-eight million years as the age of the stratified rocks and one hundred million of years as the age of the ocean.

Sir Charles Lyell, the eminent English geologist, gave as his estimate of the age of the fossil bearing sedimentary rocks, two hundred and forty millions of years.

Sir Archibald Geikie's estimate was 100 million of years.

Professor J. D. Dana's estimate was 48 million of years.

Professor Joseph Le Conte's estimate was 30 million of years.

Mr. C. D. Walcott's estimate was 28 million of years for the total period of existence of fossil-bearing sediments.

And for the time which has elapsed since the earth was in a molten state the following eminent physicists drew these conclusions:

Sir William Thomson's estimate was 100 million years.

Professor George H. Darwin's estimate was 57 million years.

Professor Simon Newcomb's estimate was 14 million years.

Dr. Alexander Winchell's estimate was 3 million years.

As to the relative durations of the greater geological time divisions the conclusions of eminent scientists are more in accord.

For the Paleozoic (Ancient Life), which includes the Silurian, Devonian and Carboniferous Ages, seventeen million, five hundred thousand years.

The Mesozoic or Mediaeval (Age of Reptiles), seven million two hundred and forty thousand years; and for the Cenozoic or Recent, which is represented by the Tertiary and Post-Tertiary Periods, two million nine hundred thousand years.

"The time since the departure of the ice of the Glacial period from this portion of the continent has been estimated by several eminent authorities, from different data, and their figures fall within six thousand to ten thousand years." *

Prehistoric Man and his Development.

BY DR. LORENZO G. YATES, F. L. S.

Honorary Member Southern California Academy of Sciences,
President of the Santa Barbara Society of Natural History, Etc.

History is defined as a narrative of past events, oral or written, and is divided into Ancient, Mediaeval and Modern. Ancient History treats of the history of man from the earliest records to the destruction of the Roman Empire, A. D. 476; Mediaeval History is the history of the Middle Ages, from A. D. 476 to the beginning of the sixteenth century, and Modern History from the close of the Middle Ages to the present time.

As the above terms apply to the world at large and man in general the study of the history of man as considered in his re-

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* Herman LeRoy Fairchild, in Proceedings of the Rochester Academy of Science, Vol. II.

lations to the groups and divisions of mankind required a different term for its definition, and the late Sir Daniel Wilson, a Scottish-Canadian archáeologist and former President of the Toronto University, coined the word Pre-Historic, using it in the title to his "Archaeology and Prehistoric Annals of Scotland," published in 1851.

This term includes the science of the races of men, their character, history, customs, institutions and language, as derived from sources other than oral or written evidence, and includes that part of Ethnology which relates to the unwritten history of the various races, nations and tribes derived from their relics.

Much has been written, and in all probability much more will be written on the subject of man's origin, and yet but little is known as to How, When or Where man first appeared on the earth.

The Book of Nature, which has thrown so much light on the origin, evolution and age of the lower orders of animals, gives comparatively little evidence which can be utilized for the better knowledge of a subject which is of such interest to the educated portion of humanity.

The "Cradle of the Human Race" has been discovered (?) by many scientists, and by them located in many and widely separated countries, but so far no incontrovertible evidence has been adduced which would give any preponderance of evidence, or even probability to any one of the given localities over the others as regarding the origin of mankind, and it seems more than probable that the locality or localities whence the race or races sprang has been entirely obliterated by changes in the earth's surface, and that the island, continent, or portion of dry land first inhabited by man now forms the bed of one or more of our great oceans.

The late Professor Joseph Leconte in his "A Century of Geology" claimed that "The fundamental idea underlying geological thought is theh istory of the earth.

"That until the beginning of the nineteenth century the earth was not supposed to have any history," it was supposed to have been made at once, out of hand, about six thousand years ago, and to have remained substantially unchanged ever since as the necessary theater of human history.

An effort to crowd all the changes which have taken place in the history of our earth into the period of time given by the Jewish writings as the age of the earth, would be like attempting to force all the water of the Pacific Ocean into a lake.

About the middle of the eighteenth century Buffon brought out dimly the idea of an abyss of time, preceding the advent of man, in which the earth was inhabited by plants and animals wholly different from those of the present day, but the priests of Sorbourne compelled him to retract such irreligious views.

Hutton in the last part of the eighteenth century first clearly concieved the idea that the science of zoology alone is a view of Nature in continuous movement—a life history—an evolution of Nature, all other sciences, including astronomy, being but "flash-light views of Nature."

Lyell showed that "causes now in operation" are producing similar effects under our eyes, of changes which have been going on since the beginning of time.

In the early years of the eighteenth century William Smith laid the foundations of stratigraphy, and Cuvier, by his studies of the wonderful discoveries of extinct mammals in the Eocene Basin of Paris, opened up to the mind of the student in a clearer light the existence of other time worlds before the present one.

It is neither essential nor practicable in this short abstract to follow the various opposing theories as to how the changes in the sea, earth and its inhabitants were brought about, as claimed by Neptunists, Plutonists, Catastrophists and Uniformitarianists, as these opposing factions were eventually reconciled by scientific assimilation.

The Catastrophists held that the whole history of the earth consisted of a series of sudden, violent, supernatural catastrophies which exterminated all life on the globe. These were supposed to be followed by periods of quiet, during which the new earth was re-peopled by direct act of creation, with new forms of life adapted to the new conditions. Species were supposed to have been created at once, out of hand, without natural process. These spread in all directions, and remained unchanged until another universal catastrophe exterminated them.

The great apostles of this theory were Cuvier and Buckland.

Lyell advocated the theory of uniformity of changes in the inorganic world, but he admitted the supernatural catastrophic changes in organic nature. After the publication of Darwin's "Origin of Species," Lyell embraced the new theory, which reconciled the opposing theories, and became generally accepted.

PUBLICATIONS RECEIVED.

"The Codling Moth." Division of Entomology. Bulletin No. 41 U. S. Department Agriculture.

"Olive Oil and its Substitutes." Bureau of Chemistry. Bulletin No. 77, U. S. Department of Agriculture.

"Bee Products in Arizona." No. 48, Agricultural Experiment Station, University of Arizona.

Transactions for December, 1903.

ACADEMY OF SCIENCES.

Los Angeles, California, December 7, 1903.

The regular monthly meeting of the Academy of Sciences was held this evening at 940 South Figueroa Street.

President Comstock occupied the Chair.

The subject for the evening was a lecture on Sweden, by B. R. Baumgardt. The speaker illustrated the subject with 100 lantern views and dealt with the ethnology, history, art and literature of that country.

There being no further business, the meeting adjourned.

B. R. BAUMGARDT, Secretary.

ASTRONOMICAL SECTION.

An unusually interesting and instructive session of the Astronomical Section was held on December 21st, the occasion being a "Herbert Spencer Symposium."

The subject was appropriately introduced by Chairman W. H. Knight, who first presented Dr. Theodore Comstock, president of the Academy, whose theme was "Spencer's Early Papers, Precursors of Recent Scientific Conclusions."

The speaker gave a clear and concise exposition of Spencer's early works, showing the remarkable insight of the great philosopher into the intricacies of nearly all of the sciences, and touching upon the beautiful simplicity and humility of the life that had commanded the respect and reverence of the civilized world.

Rabbi S. Hecht then presented the topic of "Spencer as a Man." He went into the boyhood and early manhood of Spencer, emphasizing his independence of thought and action and his devotion to the logic of principles. He also dwelt upon the encyclopaedic knowledge of the great thinker, and his power to use the knowledge he possessed.

At this stage of the proceedings an unexpected pleasure was derived from the reading by Mrs. Calvert Wilson of a poem in praise of the virtues and achievements of Spencer, written by Mrs. Elizabeth Cheney.

"Spencer's Attitude Toward Metaphysics, and His Contributions to the Science of Astronomy," was the theme of Secretary B. R. Baumgardt's remarks, who, in his usually clear and forceful style, gave a synopsis of the philosopher's views on the more abstruse topics of thought and investigation, and gave him due credit for the substantial aid rendered by him to the sciences of astronomy and chemistry, notably in his attitude toward the nebular hypothesis and the theory of the nature and origin of the universe.

Mr. W. A. Spalding was then introduced, and spoke of "Spencer's Law of the Development of Society." He represented Spencer as "one who set aside Divine revelations except so far as they could be explained on scientific principles," and as "having broken away from the thraldom of religious dogma."

Hon. W. A. Cheney was the last speaker of the evening, and his topic was "Spencer on the Phenomena of the Mind."

Judge Cheney gave high praise to Spencer's system of philosophy, calling it "the philosophic yard-stick of all time to come."

He claimed that Spencer taught the evolution of the human mind and the human soul, as well as of the human body, and that no name of the last century could be compared with his for greatness of conception and magnificence of execution.

In criticism of the English authorities in denying to him burial in Westminster Abbey because of his supposed atheistic sentiments, he said that Spencer was too great for Westminster, and the only appropriate place for his interment was in the world of thought.

The meeting was largely attended and much enthusiastic interest was manifested.

MELVILLE DOZIER, Secretary.

BIOLOGICAL SECTION.

Woman's Club House, Dec. 19th, 1903.

The meeting was called to order by the Chairman of the Section.

The minutes of the last meeting were read and approved.

The lecture of the evening was delivered by Dr. B. F. Gamber, on the subject of "Malaria." The lecture was illustrated by blackboard drawings and by a number of microscopical slides. The microscopes which were used were loaned by the University of Southern California and by the Pacific School of Osteopathy.

The paper was discussed by Mr. W. H. Knight, Dr. Bishop and a number of others.

About thirty-five members and visitors were present.

On motion the section adjourned to meet again on the second Monday evening in January, 1904.

C. A. WHITING, Secretary.

GEOLOGICAL SECTION.

Los Angeles, December 28th, 1903.

The Geological Section of the Academy of Sciences met at the Woman's Club Rooms on the 28th inst.

Wm. H. Knight acted as Chairman pro tem. President Theo. B. Comstock was introduced and gave a very interesting description of the Physical Geography and Geology of Brazil. The lecture was intensely interesting, and many questions were asked by the audience after the lecture was concluded.

G. MAJOR TABER, Secretary.

ARCHAEOLOGICAL INSTITUTE.

There has been organized in Los Angeles the Southwest Society of the Archaeological Institute of America, for the purpose of collecting, preserving and publishing the fast disappearing relics of man and his institutions in this prolific field, aided by the parent institute, of which Professor Francis W. Kelsey, of the University of Michigan, is the Secretary. The officers of this local branch are: President, J. S. Slauson; Vice-Presidents, F. M. Rindge, Dr. Norman Bridge, Colonel H. G. Otis, Rev. George F. Bovard; Recorder and Curator, Dr. F. M. Palmer; Treasurer, W. C. Patterson.

Executive Committee—Dr. Theo. B. Comstock, chairman; Rev. Geo. F. Bovard, Rev. C. J. K. Jones, Dr. F. M. Palmer, Chas. F. Lummis, Professor J. A. Foshay.

A lecture of thrilling interest was given on the evening of December 3rd by Prof. Kelsey, on "Recent Discoveries in Pompeii." Marked interest is shown by our citizens and the membership is rapidly growing. Steps have been taken to conduct researches on the Mexican and Indian folk-lore of this region, and the Executive Committee is now planning for a demonstration on this subject in January, which may come as a revelation to those who have not given the subject attention.

It is most agreeable to chronicle any event in the history of California, which, like this, tends in the general direction of the aims and purposes of the Academy of Sciences.

There should be a general Museum here to conserve and illustrate every phase of the subjects covered by the Academy of Science, the Historical Society and the Archaeological Institute.

Through the direct support guaranteed by connection with the national organization, there is hope of vitality and permanence in the new society, which we bid God speed in its work. The inaugural address of President Comstock, read before the Academy in 1902 and published in the June number for that year, of the Bulletin, contains suggestions for a very similar union of local Academies of Sciences with the American Association for the Advancement of Science, or the Carnegie Institution, or some other national rallying point.

We welcome any movement which tends to vivify and consolidate the energies of those whose labor of love in the cause of Science has been necessarily disconnected and often disheartening in the past.

NOTES AND NEWS.

From experiments conducted at the Montana Agriculture Experiment Station it was found that the evaporation and transpiration from the grain was about 16 per cent greater than the evaporation from the bare soil. For the period named, the former averages 1 1-7 inch and the latter 9-10 inch per week over the surface. For the same period the evaporation from a water surface was 13 to 16 inches per week. . . . The crop in every case not only evaporated all of the irrigation water, but robbed the soil of part of the moisture which it contained at seed time.

The changing of the sex in plants (Trop. Agr., 22 (1903), No. 11, pp. 789, 790).—The possibility of changing the sex of the date palm and of the papaw is discussed. About 80 per cent of seedlings of date palms are male. The method of the Arabs in some of the oases in the southern part of Algeria in changing these male plants into bearing trees is to tear off all the leaves from the foot stalks, at 2 or 3 years of age, so that the medial nerve is split in two from the center to the leaf sheaf. It is believed that this tearing process brings about a concentration of the sap movement in the same way as is the case in annular incisions, resulting in an accumulation of sap, "which is more necessary for the vital functions of the female plant than for those of the male." The writer states that it has been his experience that cutting off the terminal buds of papaw trees (Carica papaya) as soon as the character of the flower is apparent results in altering that character, inducing the tree to yield good fruit in place of the poor specimens borne by the so-called male trees.

Evaporation from a water surface, E. F. Ladd (North Dakota Sta. Rpt. 1902, pp. 20, 21).—Observations were made as follows: "A galvanized iron tank 3 ft. square by 14 in. in depth painted black contained a second smaller tank 12 by 12 by 12 in. in dimensions, likewise blackened. These were sunk in a grass plat level with the surface of the ground. The small tank contained distilled water and this tank within the larger was surrounded with water. Daily measurements were made of the amount of evaporation, and the results by months are given. . . . The total amount of water evaporated from a water surface for the five months, May to September, inclusive, was 28.12 in., or an average of 5.624 in. per month, or a daily average of 0.183 in. The total rainfall for the same period of time was . . . but little more than one-half as much as the water evaporation for the same period, or an average of 2.864 in. per month, or an average daily rainfall of 0.0936 in., as compared with an evaporation of 0.183 in. per day."

The New Zealand Parliament has passed a bill empowering the Governor to introduce after January, 1906, the metric system, which is then to become the system of weights and measures for the country.

The Seismological Commission of the British Association inferred from the data collected that the crust of the earth was not more than forty miles thick, the interior having a very high effective rigidity and the nucleus being probably more uniform in its chemical and physical conditions than was usually supposed.—(Science, Vol. XVIII, No. 464.)

"In Olive Oil and Its Substitutes," there may be found an interesting and accurate analysis of the oils imported into and produced in this country. The following is the summary of the author's investigations:

1. The olive oil consumed in this country is largely imported from France and Italy. The amount produced in California is relatively small, although reports warrant the statement that California is capable of supplying the entire home demand.
2. The cost of production of California oil is so much higher than that of the French and Italian oils that it competes with difficulty with the imported oils in the American market, even after the latter have paid duty amounting to 50 cents per gallon.
3. The retail prices of the best grade of oil from the three sources are much the same, but the average prices of the imported oils are much less than that of the California oil, owing to the large amount of lower grade foreign oils that are marketed in this country.
4. In the examination of olive oils for adulteration, a complete analysis is usually necessary to reveal the real nature of the oil. In cases of gross adulteration the qualitative tests, specific gravity, and index of refraction will often show the nature of the adulterant and the extent to which it is employed.
5. The adulteration of foreign oils imported into this country is practiced to a much less extent than is popularly supposed. Only 5 of the 61 samples obtained from the customs officers were found to contain other than olive oil, and none of these contained cotton-seed oil. On the other hand, oils bought upon the market, bearing labels indicating a foreign origin, were found to be quite extensively adulterated with cotton-seed oil. It seems, therefore, probable that these adulterated oils bearing foreign labels are labeled and modified after leaving the port of entry, neither the domestic nor the foreign producer being responsible for them. This practice is equally injurious to the interests of the California, French, or Italian manufacturer of pure olive oil and the consumer.
6. The results of analyses of oils of known purity show that there is a wide range in the various values ordinarily considered of importance in indicating the purity of an oil. This is especially true of the iodin number, the melting point of fatty acids, and the percentage of solid fatty acids. The California olive oils generally have a higher iodin number, a lower melting point of fatty acids, and a lower percentage of solid fatty acids than the French and Italian oils.
7. All samples containing other than olive oil were sold as pure olive oil, although in one case a careful observation of the label revealed the fact that the oil was an olive oil substitute.

The alfalfa butterfly (Colias eurytheme) has so increased in numbers since 1895 that the honey flow which used to continue well into September is now cut short in July. The adulteration of honey, in Arizona, is not commercially possible for the excellent reason that freight rates so enhance the price of glucose and sugar that these adulterants cannot be profitably used.—("Bee-products in Arizona." By R. H. Forbes.)

The local Historical Society have begun to agitate for State help in the establishment of a building to house their valuable historical books and relics. We have reached that point in civic evolution where a museum is almost an absolute necessity for educational purposes. Our Academy sections alone could in a few years stock a museum with all the representative objects native to the West.

13.

(Sonderabdruck aus dem »Zoologischen Anzeiger« Bd. XLV. Nr. 4
vom 4. Dezember 1914.)

Some Fossil Fish Scales.

By T. D. A. Cockerell.

(With 1 figure.)

In the Cretaceous rocks of Colorado, as in many other places, it is possible to find many isolated scales of Teleostean fishes. These remains have usually been put aside without any attempt at identification; but since we have paid special attention to the scales of living fishes [1], it has become evident that fossil scales, hitherto considered of small value, may indicate much concerning the character of otherwise unknown fish-faunæ.

With the experience gained from the study of recent fishes, we might well proceed to the description of the various scales found in the rocks; but before doing so, it is extremely desirable to determine the precise character of the squamation of the described fossil fishes, so far as that may be done. In this matter the published descriptions and figures are usually of small value, and it becomes necessary to study the actual specimens in Museums. This is of course a great undertaking, requiring many students; the present writer cannot hope to do much, but a few notes made at the U. S. National Museum are offered herewith.

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[1] Observations on Fish Scales. Bulletin U. S. Bureau of Fisheries. XXXII. October 1913.

Amyxon sp. (Catostomidæ.)

"From near Pikes Peak". The character of the rock shows that it is from the Miocene shales of Florissant, Colorado.

A large fish; depth near middle over 50 mm.; spread of tail fully 50 mm.; scales cover basal part of caudal fin.

Scales with strong apical radii, with quite coarse regular circuli between, these more or less angularly bent in middle line; no lateral radii; apparently a few basal radii, but these not clear.

A detached scale shows circuli going all round, the basal circuli fine; basal and apical radii, but no lateral ones. The apical number 8 or 9. These scales agree well in type with the living Catostomidæ. Especially such forms as *Moxostoma cervinum* Cope.

Leuciscus turneri Lucas. (Cyprinidæ.)

No. 4302a. Part of type lat. (Miocene, Nevada.) It is also labelled *Semotilus*. I count 9 dorsal fin-rays, and 10 anal.

Scales with about 10 or 12 fine close nearly parallel apical radii, and normal circuli; apical circuli not or hardly angled. The scales can be seen distinctly only on the caudal peduncle.

This will stand as *Richardsonius turneri* (Lucas). Some of the Japanese species which Jordan and Metz refer to *Richardsonius* have 10 anal rays. In the modern American species the number is usually less.

I take occasion to note that Jordan and Metz (Mem. Carnegie Museum, VI, p. 18) refer a Korean species of *Phoxinus* to the American genus *Hemitremia*, because, they say, I found the scales of East Asian *Phoxinus* to differ from those of the true (European) genus. As a matter of fact, I have never seen any East Asian *Phoxinus*, and my statements referred only to the European and American fishes referred to that genus.

Syllæmus latifrons Cope. (Crossognathidæ.)

No. 4979. Cretaceous. New Mexico?

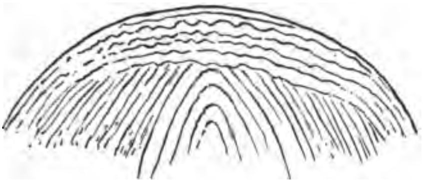
Broad scales with fine normal circuli, not at all transverse (i. e. not as in Clupeidæ) apex of scale not seen, but base and sides certainly without radii; well marked growth-lines at intervals. The absence of basal radii distinguishes this at once from *Mugil* and *Liza*. In Hay's

Catalogue of Fossil Vertebrata of North America the genus is placed in Mugilidæ, but A. S. Woodward shows that it belongs to a different, extinct, family.

Asineops squamifrons Cope. (Asineopidæ.)

Eocene. Green River, Wyoming.

Scales cycloid, with about six wavy or crinkled circuli across apical marginal area, continuous at sides with the lateral circuli, but cutting the other circuli abruptly (see figure); middle apical circuli very strongly angularly bent, and more or less angles practically to nucleus; circuli regular and rather coarse; apparently no radii, certainly no apical ones. In latinucleate (regenerated) scales the whole apical field has transverse crinkled circuli; but the other condition, as figured, is normal, and was clearly seen in very many scales.



The type of *A. pauciradiatus* Cope was examined, but the scales were not distinct; they looked as if they might be different.

The scales are totally different from those of the modern *Aphredoderus*, and Cope was evidently right in placing *Asineops* is a distinct family. The wavy apical circuli resemble those of Gerridæ, but the rest of the scale is wholly different.

Oligoplarchus squamipinnis Cope. (Percoidea.)

Tertiary. South Dakota.

About nine very strong basal radii; apical circuli coarse, right across scale, rounded, not angled; some fine longitudinal striæ at sides of apex may indicate remnants of a ctenoid area.

The scale agrees with those of the Centrarchidæ.

Plioplarchus septemspinosus Cope. (Percoidea.)

No. 4997. (Tertiary; Oregon.)

Subquadrate scale of the usual Percoid type; about 13 spreading fan-like basal radii; sides with very fine circuli of ordinary type; circuli over nuclear region coarser, forming flattened arches, transverse in middle; apical area of the typical acanthopterygian type, but could not see the marginal teeth. The type of *Plioplarchus* is a much smaller fish, with many scales scattered all around it. These show about ten basal radii, and long sharp apical teeth. The scales may be compared with those of *Acerina*, but the living genus has the nucleus more apical. There is nothing in the scales, I belive, to indicate that the genus differs from the Percidæ.

Sparnodus ovalis Agassiz. (Sparidæ.)

Monte Bolca. (Eocene.) A. S. Woodward makes this a synonym of *S. macrophthalmus*.

Typical acanthopterygian scale; 9 or 10 very strong basal radii; sides with fine normal circuli; apical margin not visible, but there is a well defined ctenoid patch with parallel jointed elements as in *Box vulgaris*. We thus have proof that this specialised type of structure is at least as old as the Upper Eocene.

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14.

APR 19 1919

Reprinted from PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON
Vol. 20, No. 8, 1918, pp. 177-182

SOME HALICTINE BEES IN THE UNITED STATES NATIONAL MUSEUM (HYM.)

BY T. D. A. COCKERELL.

The present paper completes my study of the entire collection of bees borrowed from the National Museum a few years ago. The collection proves to contain 205 new species and varieties but many of these, though in type, have not yet been published.

Halictus bentoni sp. n.

Female.—Length about 8–8.5 mm., anterior wing about 6.5 mm.; black, with the hind margins of the abdominal segments hyaline; pubescence dull white, forming broad entire bands at bases of second and following abdominal segments, but no bands on apical margins; clypeus rather produced, polished, with sparse distinct punctures; mandibles reddened apically; antennae dark, the flagellum very faintly brownish beneath; mesothorax densely and very distinctly punctured, shining between the punctures; area of metathorax hardly defined, appearing rugulose under a lens; posterior truncation with sharp but not prominent lateral margins, and no dentiform angles above; legs black, tarsi reddened at apex; tegulae rufotestaceus; wings hyaline; stigma (which is large) and nervures clear yellowish-ferruginous; abdomen moderately shining, but very finely and closely punctured all over. Microscopical characters: front very densely punctured; area of metathorax cancellate; hind spur with broad obtuse semicircular laminae.

Kotal Malul, Southern Persia, Feb. 1906 (*Frank Benton*), U. S. Nat. Museum. This may be compared with *H. albipes*, but it is more robust, with a longer head, and closely punctured first abdominal segment. Two specimens were obtained.

Halictus persicus sp. n.

Female.—Length about 5.5 mm., anteror wing nearly 5 mm.; black, with the hind margins of the abdominal segments testaceous; pubescence dull white, scanty; no apical hair-bands on abdomen, but bases of second and following segments with white bands of tomentum, broad laterally, failing in middle; flagellum ferruginous beneath; clypeus not produced, shining and irregularly punctured; front closely punctured, but shining between the punctures; mesothorax polished, distinctly but not very densely punctured, the posterior half distinctly green; scutellum punctured, with two smooth polished spaces; area of metathorax large, rather distinctly defined, irregularly plicate; posterior truncation not sharply defined; tegulae clear testaceous; wings very clear, nervures and stigma pale amber; legs black, with the knees, tibiae at apex and tarsi ferruginous, the anterior basitarsi dark, and the hind basitarsi with a dark cloud apically; abdomen broad, shining, very finely punctured; extreme apex reddish. Microscopical characters: front densely punctured, but the spaces between the punctures polished; mesothorax polished, without any sculpture between the punctures; area of metathorax with strongly wrinkled rugae, hind spur with three strong spines. The green tint on the mesothorax may be hardly appreciable.

Kotal Malul, S. Persia, Feb. 1906, three (*F. Benton*). U. S. National Museum.

The following key separates the above species from those described by Pérez from the Persian Gulf:

Metallic species with large head, related to *H. cephalicus* Morawitz;
    length 6 mm. (Mascate) .... *omanicus* Pérez
Head ordinary 1
1. Dark green, with bronzy tints on head and thorax; length 7 mm.
    (Bahrein) .... *arabs* Pérez
    General color black, with little or no green 2
2. Larger, without green tints .... *bentoni* Ckll.
    Smaller, with greenish tints on mesothorax .... *persicus* Ckll.

Halictus capitosus Smith

Tlahualilo, Durango, Mexico, at peach flowers, March 9, 1904 (*A. W. Morrill*).

Halictus morrilli sp. n.

Female.—Length about 8.5 mm., anterior wing 7.7 mm.; black, the abdomen with broad bands of white tomentum at bases of second and following segments. Very closely resembles *H. forbesii* Rob., to which it runs in Crawford's (1907) table, but the head is smaller, with the face narrower; the wings are not at all yellowish; the second submarginal cell is very broad, receiving the first recurrent nervure some distance before its end; the scutellum is shorter, with the disc highly polished; and the hind spur has numerous small broad rounded laminae, appearing nodulose or obtusely serrate. From *H. desertus* Smith it is known by the shining mesothorax, with a punctureless area on each side of middle posteriorly; the clypeus and supraclypeal area are also highly polished, with very few punctures. From *H. supercretus* Ckll. it differs by the shining thorax, white bands on abdomen, clearer wings and other characters. The tegulae are piceous; area of metathorax granular, not sharply bounded behind; posterior truncation with long, pale hair, not sharply margined; hair of head and thorax white; abdomen subglaucous, extremely finely punctured, hind margins of segments not pallid; stigma rather dull ferruginous.

Tlahualilo, Durango, Mexico, at peach blossoms March 9, 1904 (*A. W. Morrill*). U. S. Nat. Museum.

Halictus respersiformis sp. n.

Female.—Length about 6 mm., anterior wing 5 mm.; robust, black, with black legs, antennae and tegulae, but hind margins of second and following abdominal segments broadly dark brown; pubescence dull white, the bases of second and third abdominal segments with large elongate patches of white tomentum on each side, the base of fourth with white hair right across, but thin in middle; head suboval, face narrow; front extremely densely and minutely punctured; mesothorax shining, but finely and closely punctured all over, on the disc posteriorly the punctures separated by more than the diameter of one; area of metathorax minutely reticulated, with delicate oblique plicae at sides, the posterior middle V-shaped, not crossed by a sharp keel; posterior truncation heart-shaped, sharply defined, with long hair not hiding the surface; tegulae reddish-black; wings strongly dusky, stigma and nervures dark brown, second submarginal cell rather broad, receiving first recurrent nervure well before end; hind spur with three long teeth, all far from base; abdomen shining, with thin pale hair, first segment very minutely punctured, principally at sides, toward the base very finely transversely lineolate.

Tlahualilo, Durango, Mexico, at peach blossoms, March 9, 1904 (*A. W. Morrill*) U. S. Nat. Museum. In Crawford's table (1907) this runs to *H. macoupinensis* Rob. and *H. divergens* Lovell, but it is larger and more robust than these, with dark tegulae. In the Mexican fauna it resembles *H. respersus* Vachal, but is distinguished by the reticulate area of metathorax and dusky wings.

Halictus cordovensis sp. n.

Male.—Length about 6 mm., anterior wing 4.7 mm.; black, the abdomen shining, reddish black; pubescence scanty, white, rather abundant on face, but not hiding surface; head round seen from in front, face broad, clypeus not produced; no pale face-marks; mandibles chestnut-red apically; antennae long, black; clypeus closely punctured; front granular under a lens, but the microscope shows rather coarse punctures, so dense as to give a cancellated effect; mesothorax coarsely and very densely punctured, a little shining area posteriorly; scutellum polished, punctured round the sides, but scarcely at all along the middle; area of metathorax shining, with irregular coarse branching rugae; sides of metathorax coarsely cancellate; tegulae piceous, not punctured; wings dusky; stigma and nervures dark brown; second submarginal cell narrow, third long, its outer nervure (which is strong) with a double curve; legs very dark brown; abdomen without hair-bands or patches, the depressed hind margins of segments with scanty pale hair; apical plate very broadly rounded, with pallid margin; venter ferruginous, with a dusky cloud about the middle. The joints of the flagellum are hardly at all gibbous, and have a feebly sculptured surface, without any sharply pitted or honey-comb-like structure.

Cordova, Mexico, October (*L. O. Howard*) U. S. Nat. Museum. Nearest to *H. pectoralis* Smith, to the vicinity of which it runs in Crawford's (1907) table. It is larger, and has the mesothorax more coarsely and densely punctured. It also differs conspicuously by the long third submarginal cell. It has rather the aspect of a *Sphecodes*, owing to the coarse sculpture and shape of the head; but the antennae are those of *Halictus*, and the face is not densely covered with white hair.

Halictus deceptor Ellis.

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, June 1907 (*G. P. Goll*).

Rhopalictus patagonicus sp.n.

Female.—Length nearly 7 mm., anterior wing 5.7 mm.; head, thorax, legs and antennae black, the flagellum very obscurely brownish beneath, the small joints of tarsi reddish; abdomen shining ferruginous, impunctate and without hair-bands, first segment marked with black on each side toward base, venter mainly black, with base and apex broadly red; pubescence very scanty, pale fuscous on outer side of hind tibiae; face broad, the eyes strongly emarginate, clypeus and supraclypeal area distinctly greenish, clypeus high, microscopically tesselated, very sparsely punctured; front minutely rugulose; mesothorax shining, without distinct punctures, the surface microscopically tesselated; area of metathorax long, shining, without plicae; posterior truncation shining, not sharply bounded; tegulae piceous; wings faintly dusky, stigma and nervures dark brown; second submarginal cell rather broad, receiving first recurrent nervure very near its end; third submarginal cell broad, broader on marginal than second; hind spur with numerous short, slender spines; ventral abdominal segments fringed with long erect hair.

Chubut, Patagonia, from W. F. H. Rosenberg; U. S. Nat. Museum. I had at first placed this as an aberrant *Halictus*, but it is clearly congeneric with *Rhopalictus corinogaster* (Spinola) from Chile. The metathorax is much narrower dorsally, but has the same general appearance, and the shape of the third submarginal cell is the same. The strongly emarginate eyes exclude it from true *Halictus*. The next species, also a *Rhopalictus*, is still more like *Halictus*.

Rhophalictus chloronotus sp. n.

Female.—Length nearly 8 mm., anterior wing 6.5 mm.; robust formed as in *Halictus*, but the eyes distinctly emarginate, and the large broad area of metathorax, which is well bounded behind, without plicae; hair of head and thorax dull white, rather abundant; abdomen with triangular hair-patches at bases of segments 2 to 4 laterally; the apex, which is slightly reddened, especially beneath, densely hairy. Head broad, black, nowhere distinctly metallic; clypeus and supraclypeal area somewhat shining, but not polished, not distinctly punctured; antennae dark; front dull and appearing granular, the surface microscopically roughened; mesothorax dark green, dullish (microscopically tessellate) without evident punctures; scutellum more shining, faintly greenish, not punctured; other parts of thorax black; posterior truncation shining, the sharp margin only going half-way up each side; tegulae dark reddish; wings very faintly dusky, stigma and nervures reddish; second submarginal cell much higher than broad, receiving first recurrent nervure before its end; third submarginal cell broad, shaped as in *R. corinogaster*; legs very dark brown, with pale hair; abdomen broad, black, the first segment brownish, hind margins of second to fourth pallid brownish, venter with pale erect hair.

Chile (*E. C. Reed*). U. S. Nat. Museum. A pencilled label gives the exact locality which looks like "Chacogut." I cannot now be positive, but I believe this is the species with "mesothorax faintly greenish" (Trans. Amer. Ent. Soc. XXXI, p. 356) which I saw in the British Museum, labeled with a manuscript name by Spinola. It appears to be close to *Halictus chloromelas* Alfken but is larger, without the violet-blue tints on head and thorax.

Halictus perzonatus sp. n.

Female.—Length about 8 mm., anterior wing 6.2, robust, black, the abdomen dorsally dark greenish, the hind margins of the segments dark brown; eyes rather strongly but not abruptly emarginate; clypeus produced, convex, polished and shining, with sparse strong punctures; supraclypeal area also shining; front dull; flagellum obscurely reddish beneath; appearing granular under a lens, but the microscope shows dense minute but very distinct punctures, the surface between tessellate; scutellum very finely punctured, distinctly shining; area of metathorax with extremely dense and delicate plicae, connected by cross-lines, so that the surface is subreticulate, and seems finely roughened under a low-power lens; posterior truncation shining, distinctly bordered; upper margin of prothorax and tubercules densely clothed with very pale ochreous felt; tegulae piceous, with a pallid margin anteriorly and a large red spot posteriorly; wings dusky, stigma and nervures dark brown; second submarginal cell very broad, receiving first recurrent nervure some distance from end; third submarginal cell hardly larger than second; legs dark reddish-brown, with pale hair, fusceous on outer side of hind tibiae; hind spur with two broad laminae, the first long, the second short and truncate; abdomen broad, dullish, very minutely and densely punctured (except base of first segment which is shining); pale ochreous bands of dense tomentum (appressed plumose hairs) as follows: short narrow lateral apical ones on first segment, narrow lateral apical and basal ones on second, broad complete apical and basal bands on third and fourth, leaving a median dark band (the surface of segment showing) of about equal width between; apical segment with thin, hoary pubescence, not hiding the surface; venter shining black.

Carcarana, Argentina (*L. Bruner* 74) U. S. National Museum. Resembles *Halictus puelchanus* Holmberg, but distinct by the greenish abdomen with ochreous bands.

Cordulegaster dorsalis (Odonata) as an Enemy of Trout.

Mr. Frank Springer writes from the Abbott Ranch, Rito de los Frijoles, New Mexico, Sept. 1, as follows:

"I am sending you some beasties, that I should like to know a little more about. They are highly predaceous devils, and I first discovered them in the act of seizing some of a lot of young trout which I was placing in the brook here. The bug lies buried in mud or sand, in shallow parts of the stream where the current is not very swift, with only his eyes projecting. When a little fish (about an inch long) comes wiggling along close enough over the bug, he snaps, projecting his formidable mandibles [lateral labial lobes] and the shovel-like part below them for quite a distance to the front, and catches the fish by his wiggling tail. By simulating the wiggling motion of a fish with a knife-blade, I could induce the bug to snap at it, and thus saw the motion several times. . . . . I found the creatures quite numerous in the shallow, quieter waters where I was planting the young fry, and apparently they constitute a rather serious menace to the stocking of the stream, as they infest the shallow places, while the deeper water is dangerous on account of the older fish. I find that the trout eat these bugs to some extent, as in several instances they were contained in the stomach, and they are readily taken when offered as bait."

Specimens sent agree in all particulars with *Cordulegaster dorsalis* Hagen, as described and figured by Needham.—T. D. A. Cockerell, Boulder, Colorado.

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Bittacomorpha clavipes (Dipt.).

On Sept. 1, as I was crossing a road in Boulder, Colorado, I saw a strange apparition. What seemed to be a series of black and white specks, symmetrically arranged, was passing rapidly through the air. I realized at once that I was looking at *Bittacomorpha clavipes,* which I had never before met with in my years of collecting at Boulder. Having no net, I could only knock it down with my hat, breaking off the strange and beautiful legs. This is not the first capture of *B. clavipes* in Colorado, as Mr. C. P. Alexander informs me that Dr. F. H. Snow took it in Manitou Park, in August, years ago. The group is an ancient one, now represented by comparatively few species, scattered over the earth. A species of the same genus (*B. miocenica* Ckll., 1910) has been found fossil in the miocene shales at Florissant.—T. D. COCKERELL, Boulder, Colorado.

17.

The Bee-genus Halictoides in North America (Hym.).

By T. D. A. Cockerell, University of Colorado, Boulder, Col.

The genus *Halictoides,* as the name indicates, consists of more or less *Halictus*-like bees, which however belong to the Panurgine series. The species are not very numerous, but are often remarkable for their secondary sexual characters. One of the most extraordinary, with the male legs elaborately produced into spines and angles, has been separated by Viereck as a distinct genus, *Cryptohalictoides.* This species, *C. spiniferus* Vier. comes from Nevada. Several subgenera have also been recognized. Cockerell and Porter (Ann. Mag. Nat. Hist., Dec. 1899, p. 420), after investigating the mouth-parts of a number of species, concluded that typical *Halictoides* (type *H. dentiventris* Nyl.) was not represented in America, and placed the American species then available in a new subgenus *Parahalictoides;* with the exception of *H. marginatus,* which fell in another subgenus, *Epihalictoides.* A third American subgenus is *Conohalictoides* Viereck, based on *H. novaeangliae* (*lovelli* Vier.). *Neohalictoides* Vier. cannot be separated from *Parahalictoides,* the type of the former (*maurus*) being closely related to that of the latter (*campanulae.*).

The following table separates the known species. *Halictoides oryx* Viereck is confirmed as a valid species by the discovery of the female. I find I have a female taken by Mr. S. A. Rohwer in the Canadian Zone on North Boulder Creek, Colorado, at flowers of *Grindelia erecta,* Aug. 21, 1907. It is larger than *H. tinsleyi,* and is readily separated by the distinctly green mesothorax, and greenish tints on middle of abdomen. The head is very broad, and the mesothorax very hairy.

Stigma clear amber color; wings perfectly hyaline 1
Stigma dusky or dark; wings usually brownish, or at least not quite clear 2
1. Area of metathorax dull, minutely sculptured (late summer and autumn species) ....*marginatus* Cress.
Area of metathorax shining (spring species) ..*pulchricornis* n. sp.
2. Face narrow, facial quadrangle conspicuously longer than broad, (species of N. E. States) ....*novaeangliae* Rob.
Face not thus narrow, usually quite broad, (species of W. States).3
3. Face covered with stiff black hairs, especially dense and abundant between antennae ....*maurus* Cress.
Face not thus covered with black hair 4
4. Mandibles with an extremely long curled tuft of tawny hair beneath; hind tibiae fringed with extremely long white hair, (S. Calif.) ....*davidsoni* Ckll., ♂
Mandibles with no such tuft 5
5. Middle basitarsi expanded into a large flat lamina (S. Calif.) ....*virgatus* Ckll., ♂
Middle basitarsi not thus modified 6
6. Hind tibiae enormous, claviform; hind tarsi very short, the basitarsi expanded into a flat lamina (S. Calif.)..*mulleri* Ckll., ♂
Hind legs not thus modified 7
7. Male abdomen with a large tuft of dark fuscous hair subapically beneath, (species from Washington State, allied to *maurus*) ....*campanulae* Ckll.
Male abdomen without such a dark tuft 8
8. Males; clypeus densely covered with long hair 9
Females 11

9. Mesothorax distinctly green, rather closely punctured all over; antennae very long (New Mexico) .... *oryx* Vier.
Mesothorax shining black 10
10. Disc of mesothorax sparsely and weakly punctured.. *harveyi* Ckll.
Mesothorax with strong well separated punctures. *saundersi* Ckll.
11. Clypeus polished, hardly punctured, with a projecting lobe at each lower corner (New Mexico)............... *fallugiae* Ckll.
Clypeus roughened or conspicuously punctured 12
12. Mesothorax entirely dull; small *Halictus*-like species (New Mexico) .... *tinsleyi* Ckll.
Mesothorax shining 13
13. Front and vertex bluish; abdomen with white hair-band on third and fourth segments .... *mulleri* Ckll.
No blue tints 14
14. Abdomen with conspicuous white hair-bands....... *virgatus* Ckll.
Abdomen without hair-bands 15
15. First four segments of abdomen with very broad and conspicuous testaceous hind margins, (S. Calif.) .... *saundersi* Ckll.
Abdominal segments not thus margined (N. M.) .. *harveyi* Ckll.

Halictoides pulchricornis n. sp.

♂. Length about 7 mm., slender, black, shining; head and thorax with long white hair, dense and pure white on face; head broad, facial quadrangle broader than long; mandibles black, dark red at apex; labial palpi with first joint about 270 microns long, the other three together about 400, the second joint about 170; joints of maxillary palpi subequal, the shortest much more than half length of longest; antennae long, the flagellum, except at base, bright orange-fulvous, dusky above.

Mesothorax polished, hardly punctured; area of metathorax depressed, shining, the basal half with fine plicae; tegulae rufotestaceous; wings hyaline, stigma amber color, nervures darker; b. n. falling short of t. m.; legs black with white hair; middle femora short and deep; hind tibiae large.

Abdomen with hind margins of segments broadly ferruginous, bases of segments with thin white hair-bands; apical plate small, spatulate.

♀. More robust; clypeus shining, with rather large shallow punctures; flagellum very short, bright orange-fulvous, except at base; face very broad; vertex depressed on each side of ocelli; abdomen broad.

Hab.—Mesilla Park, New Mexico, at flowers of plum, April 14 (*Cockerell*). Allied to *H. saundersi* Ckll., but easily separated by the clear wings with amber stigma, and the very feeble, evanescent punctures.

Type in my collection.

18.

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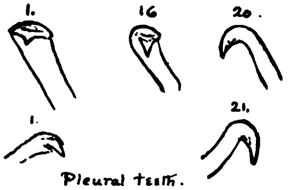
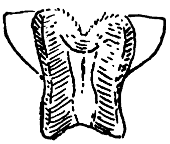
1915 Pomona Journal of Entomology and Zoology, Vol. VII, No. 4, Dec.

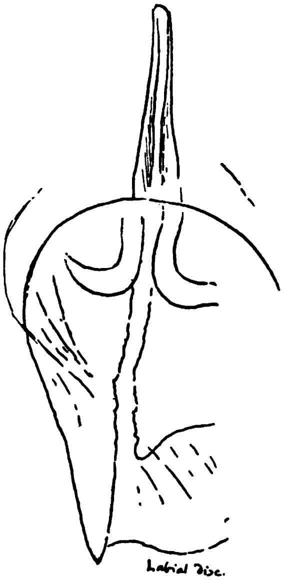
The Nudibranch-Genus Triopha in California

By T. D. A. Cockerell

The genus *Triopha,* named by Bergh in 1880, includes a series of nudibranchiate molluscs occurring on the Pacific Coast of North America. On August 23, 1915, a new species of this genus was obtained by the Scripps Institution in shallow water off La Jolla, California, the particular lot of material containing it being listed as "haul 74." It may be known as *Triopha scrippsiana* n.sp., with the following characters:

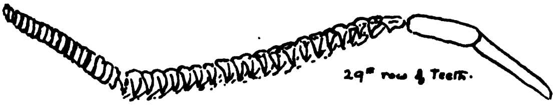






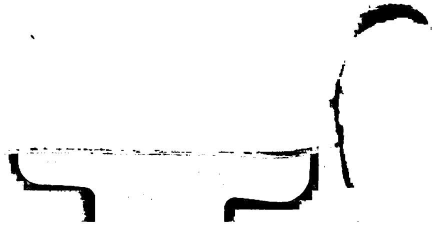
Length about 27 mm.; white, marked with bright vermilion, like *T. carpenteri;* but tentacles pale yellowish olivaceous, not at all red; appendages of frontal margin (six on each side, one or more very small), small, the larger ones tuberculate, and all wholly white; small tubercles on body very bright vermilion, but they are mere subpyramidal eminences, not elongated structures as in *carpenteri.* Branchiæ very slightly marked with red, tip of tail red. (Described from living specimen.)

The distinctness of the species is confirmed by the radula, which has the teeth in about 58 rows, the formula for 29th row being 16-22-2-2-22-16. The inner 2-2 represents the rhachidian plates, which are very different from those of *T. carpenteri,* the inner ones being strap-like, very greatly transversely elongated, while the outer are also elongated. The form of the pleural teeth and uncini is about as in *carpenteri,* but the pleural teeth are more numerous. The labial disc is characteristic of the genus.



The Californian species of *Triopha* may be separated thus. It is doubtless correct to refer Cooper's *Triopa catalinæ* to this genus.

Body with light spots on a dark ground........................ 1
Body without light spots.. 3
1. Frontal appendages 14; ground color, yellowish; processes vermilion. *catalinæ* (Cooper).
Frontal appendages 12 or fewer; ground color brown, often dark 2
2. Branchial plumes bright red. *maculata* McFarland.
Branchial plumes white, the tips more or less red. *grandis* McFarland.
3. Body yellowish brown, processes tipped with vermilion; pleural teeth on each side, 7 or 8 in a row. *grandis* McFarland variety.
Body orange, processes tipped with vermilion; pleural teeth on each side, 4 in a row. *aurantiaca* Cockerell.
Body white, with the processes vermilion; pleural teeth on each side, 9 or more in a row... 4
4. Rhinophores red; frontal appendages red. *carpenteri* (Stearns).
Rhinophores yellowish olivaceous; frontal appendages white. *scrippsiana* Cockerell.



From the ANNALS AND MAGAZINE OF NATURAL HISTORY,
Ser. 8, Vol. xv., *June* 1915.

19.

Descriptions and Records of Bees.—LXVII.

By T. D. A. COCKERELL, University of Colorado.

Paracolletes versicolor (Smith, 1853).

Mt. Wellington, Tasmania, 1300–2300 ft., Jan. 15–Feb. 6, 1913, 1 ♀, 2 ♂ (*R. E. Turner*). The female was described by Smith; the male is *P. spatulatus*, Ckll., 1905. In the same locality, at about the same time, Mr. Turner took a male *P. providellus bacchalis*, Ckll., var. *a*. Both species were described from the mainland of Australia.

Paracolletes pachyodontus, sp. n.

♂.—Length 8–9 mm.

Black, with the mandibles red (except at extreme base), and the abdomen with approximately the lateral thirds of first three segments, as well as apical bands on the first four, deep chestnut-red; hair of head and thorax long and dull white, abundant on face, but vertex, mesothorax (except anteriorly), and most of scutellum with dark fuscous hair; a little fuscous hair below tegulæ; clypeus with sparse strong punctures; supraclypeal area prominent, smooth, and shining; antennæ short and thick, like those of a female, the flagellum red beneath; vertex strongly punctured; mesothorax finely and densely punctured, but glistening; postscutellum with a thick short median tooth; tegulæ piceous, punctured. Wings with the apical margin broadly dusky, stigma and nervures piceous; second s.m. small, receiving first r. n. a little beyond middle. Legs black, with thin white hair. Abdomen shining, but the surface finely rugoso-punctate, first suture impressed; thin white hair on dorsal segments, but no bands; apical plate red, rounded.

Hab. Yallingup, S.W. Australia, Nov. 1913, three (*R. E. Turner*). British Museum.

A distinct species, somewhat related to *P. rhodopus*, Ckll., but recognizable at once by the colours, short antennæ, &c.

Paracolletes viridicinctus, Cockerell, 1905.

Eaglehawk Neck, Tasmania, Feb. 12–March 3, 1913 (*R. E. Turner*).

Paracolletes obscurus (Smith, 1853).

Mt. Wellington, Tasmania, 1300–2300 ft., Jan. 15–Feb. 6, 1913, three (*R. E. Turner*).

Nomia submœrens, Cockerell, 1914.

Eaglehawk Neck, Tasmania, Feb. 12–Mar. 3, 1913 (*R. E. Turner*).

Euryglossa latissima, Cockerell, 1914.

This was described from the female, but three males are now before me, with the same data (Eaglehawk Neck, Tasmania; *Turner*). The male is somewhat smaller, and has the abdomen piceous, rufous at extreme apex. Otherwise there is no conspicuous difference, except that the antennæ are longer, and there is more long, loose, white hair about the face and mouth. The dark abdomen makes the male appear superficially like a distinct species.

Megachile tarsatula, sp. n.

♂.—Length about 6 mm.

Black, including the mandibles and long slender antennæ, but all the tarsi bright ferruginous; anterior tarsi simple, and coxæ with small short spines; head large and round, face with pale ochreous hair; clypeus with large punctures, with shining surface between, on upper part, but lower part with dense minute punctures; supraclypeal area very densely punctured; vertex with strong large punctures, and thin pale ochreous hair; mesothorax and scutellum finely and closely punctured (in complete contrast with vertex), the surface between the punctures shining; thorax above with very thin and short pale ochreous hair, and no distinct sutural bands; area of metathorax granular at base and sides; tegulæ rufo-piceous. Wings hyaline, dusky apically, stigma large, dark ferruginous. Legs with short pale hair. Abdomen finely and closely punctured, the bases of the segments deeply impressed; first segment with lateral pale apical hair-patches, third and fourth with conspicuous basal bands of glittering scale-like pubescence, fifth with the basal half thinly covered with pale hair, and sixth with even more, the hair pale ochreous-tinted and glittering; hind margins of second and following segments very narrowly fuscous; sixth segment vertical, the keel feeble, not or barely depressed in middle, a short tooth on each side of apical margin of segment.

Hab. Cuernos Mts., Negros, Philippine Is. (*Baker*, 3147, =type); Dapitan, Mindanao (*Baker*, 3139).

This minute species recalls some of the Australian forms, but does not resemble them in detail. I do not know any near relative. The small size and red tarsi readily distinguish it in the Philippine fauna.

Megachile indianorum, Cockerell, variety *a.*

A male from Jacksonville, Texas, at *Helenium tenuifolium*, Aug. 11, 1906 (*Bishopp*), represents a new variety with black legs. It differs in the pubescence and the colour of legs from Cresson's description of *M. deflexa*, but it is not improbable that both this insect and true *indianorum* represent varieties or races of *deflexa*. It also seems possible that *M. megagyna*, Cockerell, is the female of the present variety, although it has darker wings, and the strong coarse sculpture of the clypeus is entirely different. A female *M. megagyna* was taken at Ardmore, Okla, July 11 (*Jones*).

Megachile amica, Cresson.

The male closely resembles that of *M. integra*, Cresson, but is certainly distinct, being smaller, with no band in the suture between scutellum and metathorax, while the apex of the abdomen beneath presents a sharp median spine, wanting in *integra*. The curious claviform hairs beneath the white fringe on anterior tarsus are characteristic. The species, however, appears to be remarkably variable. One from Cotulla, Texas, on *Verbesina encelioides*, April 27, 1906 (*F. C. Pratt*), is scarcely 8·5 mm. long, and has the hair of head and thorax above strongly ochreous. Another from Cotulla, at *Opuntia*, April 16, 1906 (*Pratt*), is of normal size, with the normal pallid hair. One from Victoria, Texas, April 27, 1907 (*J. D. Mitchell*), is of normal appearance, but differs from the Cotulla form by having the short stiff brush of hair near the base of the anterior basitarsus anteriorly dark fuscous instead of light orange.

The female of *M. amica* has remained unknown, but I recognized it with some confidence in specimens from Cotulla, at *Monarda punctata*, May 12, 1906 (*J. C. Crawford*) ; San Diego, Texas, April 23 (*Mitchell*) ; and Corpus Christi, Texas, at *Anogra pallida*, April 12, 1906 (*Pratt*). This female looks very much like *M. brevis*, but is especially to be recognized by the very long hairs standing out from the posterior border of the middle tarsus. The ventral scopa is white, black on last segment ; the last dorsal segment is somewhat concave in profile, and has coarse, but rather short, erect, black hair. The hair on the head and thorax above is white or slightly greyish, sometimes (San Diego specimen) largely fuscous on vertex. The clypeus is normal and densely punctured. The reference of this female to *amica* is strengthened by the occurrence of similar characters in the middle tarsi and scopa of *M. soledadensis*, Cockerell.

Megachile comata, Cresson.

Described from the male, but two females are before me, from Albuquerque, New Mexico, Aug. 1894 (*Snow*). The female is large and robust, about 16 mm. long; ventral scopa pale yellowish, becoming white basally ; last dorsal segment with fine, erect, wholly pale hair ; when abdomen is seen from above, no black hair projects at sides ; hind basitarsus very broad ; mandibles quadridentate. There is no light hair-band in the suture anteriorly bounding scutellum.

Megachile candentula, sp. n.

♂.—Length a little over 7 mm.

Black, including the very long antennæ, mandibles, tegulæ, and legs ; wings strongly smoky, nervures and stigma rufo-piceous ; eyes dark brown ; face with short ochreous hair, not hiding surface, vertex with short sparse black hair, lower part of cheeks with long abundant pure white hair; clypeus extremely densely punctured, with a slender smooth median line ; front dull, rugoso-punctate ; vertex with very large well-separated punctures ; mesothorax and scutellum shining, with very strong distinct punctures and thin short black hair; pale hair-band in scutello-mesothoracic suture feeble or absent; postscutellum with rather long rufo-fuscous hair; area of metathorax shining; tubercles fringed with dense pale ochreous hair; pleura strongly and closely punctured, and with very thin pale hair. Legs ordinary, anterior tarsi simple and coxæ without spines; claws red with black tips. Abdomen short, the three segments closely and finely punctured, the fourth much smoother; first three with red marginal bands, evanescent in middle, on first reduced to lateral patches, fourth (except part of disc) and fifth covered with red pubescence, with scattered black hairs intermixed, the red is a deep orange-ferruginous; sixth segment retracted, with red hair at sides, its keel not at all prominent, feebly bilobed at apex; no apical (subventral) teeth or spines. Spurs of hind tibiæ cream-colour.

Hab. Dapitan, Mindanao (*Baker*, 3140, 3144).

A distinct species, recalling by the colour of the abdomen *M. doanei*, Ckll., from Tahiti, but very different structurally.

Megachile hookeri, sp. n.

♀.—Length almost 15 mm.

Robust, black, including mandibles, tarsi, and antennæ. Wings hyaline, faintly dusky, with dark fuscous nervures; pubescence greyish white, long and black on vertex, on middle of mesothorax mixed with black, only a very few dark hairs on scutellum. Abdomen with pale hair on first two segments and basal part of third, but beyond that the hair is coarse, erect, and black, except that segments 3 to 5 have conspicuous entire white hair-bands, and the sixth, except basally, has a fine pale pruinose pubescence; sixth dorsal segment in outline concave, with the black bristles very large and conspicuous; ventral scopa entirely clear white. Mandibles broad, quadridentate, with long golden hairs arising from beneath the basal half; white hair of face and front abundant; clypeus minutely rugoso-punctate, but largely concealed by hair, its lower margin straight and shining; vertex with small punctures on each side of the ocelli, but more posteriorly with large punctures; mesothorax and scutellum closely punctured, disc of mesothorax more sparsely punctured, showing the shining surface; no white lines of hair on mesothorax and sutural band; b. n. falling short of t.-m.; anterior tarsi with a fringe of long white hairs behind; small joints of middle tarsi moderately thickened; posterior basitarsi only moderately broadened.

Hab. Lehi, Utah, Sept. 9, 1905 (*W. A. Hooker*). U.S. National Museum.

Superficially just like *M. comata*, Cress. (♀ from Albuquerque, New Mexico; *Snow*), but easily distinguished by the coarse black hair on apical part of abdomen above. In this feature it resembles *M. manifesta*, Cress., which is much smaller and otherwise different.

Megachile innupta, sp. n.

♀.—Length 12 mm.

Black, robust, with rather abundant silky greyish-white hair, forming entire and conspicuous bands on abdominal segments 3 to 5; clypeus with thin inconspicuous hair; sides of vertex with a small amount of black hair; hair of thorax above entirely clear white; first two abdominal segments with copious white hair, third with thin pale hair in transverse sulcus, and short black hair between that and the apical band, fourth and fifth (except the bands) with short black hair, the fourth with a little pale basally, sixth with thin and rather short, erect, pale hair; ventral scopa white basally, but clear ferruginous on the last two segments.

Mandibles broad, quadridentate, with golden hairs from the lower border; clypeus strongly and densely punctured, with a thick, shining, essentially straight lower margin, but the sides of the margin broadly lobed or extended beyond the level of the central part; antennæ black; sides of vertex with large scattered punctures on a shining ground; mesothorax densely punctured, smooth and shining in the anterior middle; no lines of hair or sutural band; tegulæ rufo-piceous. Wings hyaline, faintly dusky, nervures dark rufo-fuscous, b. n. falling short of t.-m.; anterior tarsi very thick, with long glittering white hairs behind; small joints of middle tarsi remarkably thick and short; hind basitarsi much broadened; all the claws with a well-developed basal tooth. Abdomen finely punctured, sixth dorsal segment in profile gently concave, without a distinct lip; when the abdomen is seen from above, there are no conspicuous dark hairs projecting laterally from the apical segments.

Hab. Pueblo, Colorado, Aug. 10, 1907 (*G. M. Hite*).

This looks much like *M. nupta*, Cress., but is easily separated by the lack of a distinct lip on the last dorsal segment, the much more swollen anterior tibiæ, and the long hair on anterior tarsi behind. *M. nupta* has still shorter middle tarsi, the basitarsi being shorter. The clypeal punctures of *nupta* are larger and not so dense. In the same locality, on the same day, Mr. Hite took *M. cleomis*, Ckll., ♀.

Megachile abluta subrixator, subsp. n.

♀.—Length 9 mm.

Agrees with the smaller form of *M. rixator*, Ckll., except that the clypeus has very large strong punctures, distinctly separated near the middle, and, while the median line is smooth, there is no keel. The end of the abdomen also differs, in that the last dorsal segment in lateral profile shows no evident erect hair and the last ventral segment has the hair entirely black. Ventral scopa very bright ferruginous, but white at base and black at apex; antennæ black; hair of head above reddish fuscous, of thorax above brownish ochraceous; conspicuous pale sutural bands in front and behind scutellum. Easily known from *M. abluta*, Ckll., by the much larger and less dense punctures of clypeus and the bright red ventral scopa.

Hab. Iligan, Mindanao, Philippine Is. (*Baker*, 3148 = type); Dapitan, Mindanao (*Baker*, 3142).

Males from Dapitan do not materially differ from *M. abluta*. The whole face is densely covered with pale golden hair. *M. abluta* and *M. rixator* were described from Formosa. Another small Philippine species (Luzon and Mindanao; *Baker*), named in manuscript by Friese, is very close to the Formosan *M. tranquilla*, Ckll.

Megachile bishoppi, sp. n. (*townsendiana*, subsp. ?).

♂.—Length about 10·5 mm.

Hair of head and thorax above pale yellowish; anterior coxæ spined; anterior tarsi simple. A species of the group of *M. parallela*, Sm., close to *M. townsendiana*, Ckll. (having keel of sixth abdominal segment curved downward), from which it differs thus: hair of face creamy (instead of pure white); thorax above very hairy, with only a very indistinct band in scutello-mesothoracic suture; keel of sixth abdominal segment smaller, less deeply emarginate, with the lobes on each side of the emargination much smaller.

Hab. Paris, Texas, May 24, 1904, two males (*F. C. Bishopp*). U.S. National Museum.

Megachile mendica coquilletti, subsp. n.

♂.—Length a little over 11 mm.

Pubescence pale greenish ochraceous; small joints of anterior tarsi light ferruginous; hair fringing anterior tarsi behind very long; no fuscous hair on thorax above; keel of sixth abdominal segment jagged on each side of the rounded emargination; apical teeth of abdomen five, the median one well developed, the lateral ones small, a trifle nearer to the sublateral than the sublateral are to each other. The abdomen has conspicuous dark hair on segments 3 to 5. The scutello-mesothoracic suture is wholly without a light band.

Hab. Los Angeles County, California (*Coquillett*). U.S. National Museum.

I describe this as a subspecies of *M. mendica*, but it is equally close to *M. brevis*, and until the female is known we cannot be sure which it should be associated with. Males collected by Snow in Arizona, which I consider to represent a variety of *brevis*, resemble *coquilletti* in their rather large size and ochreous hair, but they have dark anterior tarsi, and the keel of sixth segment only faintly crenulate on each side of the emargination.

Megachile penicillata, sp. n.

♀.—Long and narrow, with the general form and appearance of *M. occidentalis.*

Black, including the tarsi, mandibles, and antennæ; wings strongly fuscous. Head large, rounded; eyes prominent, chocolate-colour; mandibles quadridentate (quinquedentate in *occidentalis*); labrum broad at apex, with two pencils of red hair directed forwards (vertically to plane of labrum); clypeus strongly subconfluently punctured, with a slender smooth median line, lower margin very broadly but shallowly excavated, or it could be described as straight, with a broad low lobe at each side; sides of face, and region above and between antennæ, with copious greyish-white hair; hair of clypeus extremely thin, but not fuscous; region behind ocelli large, with strong quite close punctures; mesothorax strongly and extremely densely punctured, with very short and sparse pale hair, but a pair of oblique bars of dense white hair (as in *occidentalis,* but not so large) in front, a light band along lateral margins, and a thin one in scutello-mesothoracic suture; tubercles densely covered with creamy-white hair; tegulæ rufo-piceous. Legs with white hair, pale yellowish on inner side of tarsi; hind basitarsi very slender. Abdomen parallel-sided, strongly but not densely punctured, with narrow white hair-bands on the first four segments, that on first practically reduced to large triangular lateral patches; sixth segment broadly hoary at base, and without erect hairs; ventral scopa short and compact, pure white, black on last segment.

Hab. Trinity, Texas, Aug. 30, 1906, two (*F. C. Bishopp*). U.S. National Museum.

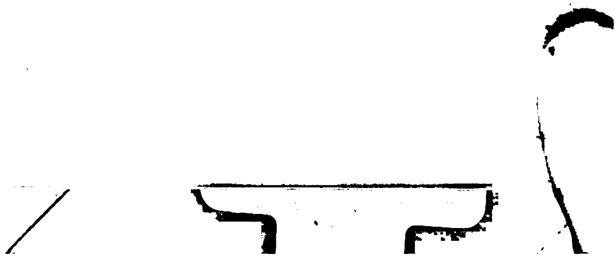
M. occidentalis, Fox, has the mesothorax much more finely punctured, and the last dorsal segment with a deep transverse subapical groove, represented only by a transverse depression in *penicillata.*

Bombus rufocinctus, var. *castoris*, v. n.

Bombus rufocinctus, Cress., var. 6, Franklin, Trans. Amer. Ent. Soc. xxxviii. p. 443.

♂.—Abdomen with yellowish-fulvous hair on first two dorsal segments, black on all the others.

Hab. Beaver Creek, Montana, 6300 ft., Aug. 1913 (*S. J. Hunter*). The abdomen is coloured as in the male of *B. vagans*, Smith. There is much yellow hair on the head above, and a large yellow patch in the middle of the face.



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From the ANNALS AND MAGAZINE OF NATURAL HISTORY,
Ser. 9, Vol. ii., *November* 1918.

Descriptions and Records of Bees.—LXXXI.

By T. D. A. COCKERELL, University of Colorado.

Augochlora (*Odontochlora*) *lyoni*, sp. n.

♀.—Length about 8·5 mm., anterior wing 6.

Robust, black, with strong metallic tints as follows: clypeus (which is smooth, with well-separated large punctures) green in middle and purplish at sides; cheeks blue-green next to orbits, otherwise purplish; region on each side of antennæ obscurely purplish; vertex greenish; tubercles bright green; mesothorax with disc obscurely green, margins purple; scutellum greenish; postscutellum and area of metathorax purple; mesopleura dark purple edged with blue; first abdominal segment suffused sublaterally with bright green and purple; second with similar colours, but less distinct, the remaining segments black. Flagellum ferruginous beneath; front dull and granular; ocelli not enlarged; process of labrum broadly truncate, slightly bigibbous; mesothorax densely punctured, except the posterior middle, where the punctures are sparse on a shining ground; area of metathorax with numerous very fine more or less wrinkled striæ; posterior face with no sharp margin; tegulæ reddish. Wings dusky, stigma and nervures pale yellowish brown; first r. n. meeting second t.-c. Legs reddish piceous, with pale pubescence; hind spur simple. Abdomen shining, thinly hairy, with very small punctures; first dorsal segment with a low tubercle on middle of disc; first ventral segment with a long slender spine; last dorsal segment with fuscous hair.

San Julian, Venezuela, July 19, 1900 (*M. W. Lyon, Jr.*). U.S. Nat. Museum.

Nearest to the Mexican *A. zophodes* (*Halictus zophodes*, Vachal), but distinguished by the smooth and shining surface of clypeus, with well-separated punctures. The tubercle on the first dorsal segment of abdomen recalls the Australian *Halictus mirandus*, Ckll.

Agapostemon viequesensis, sp. n.

♀.—Length about 8 mm., anterior wing 6.

Head and thorax brilliant bluish green; lower margin of clypeus broadly black; labrum and mandibles red, the latter black subapically; sides of face and front suffused with purple-blue; flagellum dull ferruginous beneath, but the last joint bright ferruginous on both sides; clypeus and supraclypeal area shining; mesothorax dull, minutely granular; scutellum rather yellowish green, shining, somewhat bigibbous; area of metathorax purple, poorly defined, with obscure rugæ; posterior truncation bright green, with a sharp edge; tegulæ light ferruginous. Wings dusky hyaline, stigma clear honey-colour; second s.m. receiving first r. n. a considerable distance from its end. Legs light ferruginous, with pale yellowish hair, that on outer sides of tibiæ more or less fuscous. Abdomen mainly yellowish green, with blue-purple shades on apical half, but the first three segments have transverse median bands of reddish brown, where the surface is not metallic; bases of segments with pale tomentum; venter mainly pale fulvous.

Vieques Island, Porto Rico, West Indies, Feb. 1899 (*Aug. Busck*). U.S. Nat. Museum.

In Vachal's table it runs out at 14, and it is scarcely to be compared with any described species. The extreme bases of the abdominal segments are testaceous, but the apical margins sliding over them are not noticeably discoloured.

Neocorynura discolor (Smith).

Augochlora tisiphone, Gribodo, is a synonym. Smith's type was from Oajaca, and Gribodo's was marked "Oajuca?" (*sic*).

The following species are now recorded from new localities:—

Augochlora radians (Vachal). Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 25 (*Schwarz and Barber*). This is probably the same as the so-called *A. vesta* from Mexico in the British Museum, but it is not true *vesta*.

A. fervida, Smith. Tlahualilo, Durango, Mexico, at peach blossoms (*A. W. Morrill*).

A. illustris (Vachal). Colombia, from C. F. Baker collection.

A. phœmonoë (Schrottky). Sapucay, Paraguay, March (*W. T. Foster*).

A. nigrocyanea, Ckll. Tampico, Tamaulipas, Mexico, Dec. 6 (*F. C. Bishopp*).

A. esox (Vachal). Paraiso, Canal Zone, Panama, Jan. 18 (*Aug. Busck*).

A. seminigra, Ckll. Cordoba, Mexico, Jan. 20 (*F. Knab*).

The *A. nigrocyanea* females from Tampico are variable; one has strong purple tints on apical part of abdomen, which the other lacks; the latter has the mesothorax black.

Xenoglossa howardi, sp. n.

♂. (Type.)—Length about 12 mm., anterior wing 9.

Black, including the clypeus and antennæ; mandibles fulvous apically, bidentate, but with a slight notch on inner side indicating the rudiment of a third tooth; labrum brown at sides, covered with appressed pale hair; maxillary palpi 5-jointed; hair of head long and creamy white, with some fuscous hairs on vertex and below antennæ; hair of thorax above clear reddish fulvous, without black; a large patch on middle of mesopleura, and tubercles, with dark fuscous hair; tegulæ ferruginous. Wings dusky. Legs black, the spurs stramineous, and tarsi at apex ferruginous; hair of middle and posterior tibiæ and tarsi dark brown, but the femora and anterior legs with pale hair. Abdomen shining black, minutely punctured, hind margins of segments 2 to 4 suffusedly reddened; no hair-bands, but base of second segment at sides with thin greyish hair; venter with thin whitish hair.

♀.—Length about 12·5 mm.

Similar to the male, but all the legs with dark brown hair; dark brown hair on sides of thorax more extensive; second and third abdominal segments with a thin transverse band of greyish tomentum, not conspicuous.

Type (male) from the Federal District, Mexico (*J. R. Inda*, 56). U.S. Nat. Museum. Female from Oaxaca, Mexico, Sept. 18 (*L. O. Howard*).

Related to *X. assimilis* (Smith), but without the black patch of hair on thorax above in female. The male antennæ are formed as in *X. pruinosa* (Say). The species belongs to the subgenus *Peponapis* of Robertson. though differing from his type-species in the black clypeus of male and reduction of pale hair on female abdomen.

Allodape candida, Smith.

♀.—Mkonumbi, near Lamu, Tana River, E. Africa, Sept. 1892 (*Chanler Exped.*).

This differs slightly from Smith's description, and from a specimen from Abyssinia, sent by Gribodo, in that the light band on clypeus is not at all widened at the lower end.

Leptergatis globulifera, sp. n.

♂.—Length 6–6·5 mm.

Black, with the long flagellum dull ferruginous beneath, tegulæ rufo-piceous, legs more or less suffused with reddish, the tarsi and tibiæ at apex ferruginous.

Close to *L. armata* (Smith), differing thus: scape dark; ocelli closer together; clypeus and labrum entirely black, mandibles mainly dark reddish; tegulæ darker; abdominal hair-bands less distinct; wings a little more dusky. The hind legs are practically as in *L. armata*. The co-type has the mandibles paler, with a large pale yellowish spot, beyond which they are ferruginous.

Venezuela; type from Aroa, Dec. 12, 1910 (*M. A. Carriker*). U.S. Nat. Museum. Another is from Lagunita de Aroa, 2000 ft. alt. (*M. A. Carriker*).

Prosopis holomelæna, sp. n.

♀.—Length about 6 mm., anterior wing 4·5.

Entirely black, without light markings; robust, with no depression between first and second dorsal abdominal segments; clypeus long, dull, the punctures very indistinct; apical part of flagellum bright ferruginous beneath; punctures of mesothorax and scutellum excessively minute, the surface between them microscopically rugulose; area of metathorax with irregular rugæ; tegulæ black. Wings slightly dusky, stigma and nervures very dark; second s.m. long; recurrent nervures meeting the transverso-cubitals; tibiæ and tarsi with some pale hair. Abdomen shining, impunctate, the surface with a delicate microscopical tessellation.

Buitenzorg, Java, March 10, 1909 (*Bryant and Palmer*). U.S. Nat. Museum.

Nearest to *P. impunctata*, Friese, but easily separated by the entirely black face.

Prosopis coroicensis, sp. n.

♂.—Length about 7·5 mm., anterior wing 6·2.

Black, robust, without yellow markings on thorax or legs; face long, eyes very long; clypeus (except a narrow dark stripe on each side), large supraclypeal mark (rounded above), lateral face-marks (extending along orbital margins halfway up front, where they end obtusely, shaped like feet on tip-toe, with very long tapering toes), all bright chrome-yellow; antennæ piceous; scape very short; mandibles stout, suffused with reddish; front dull, very densely and finely punctured; mesothorax and scutellum dull, with very large well-separated punctures; mesopleuræ with large sparse punctures; area of metathorax with coarse transverse and longitudinal ridges; posterior truncation very coarsely sculptured, flat, with well-defined margins; tegulæ piceous. Wings deep fuliginous; first r. n. joining first s.m. considerably before its end. Legs more or less reddish, the anterior tibiæ dusky ferruginous in front. Abdomen shining, without hair-bands; first two segments quite strongly punctured, third with minute punctures; first ventral segment emarginate at apex.

Coroico, Yungas, Bolivia, May 1, 1899. U.S. Nat. Museum. No collector's name is given.

By the venation this resembles *P. petroselini*, Schrottky, but it is easily separated by the fuliginous wings and other characters.

Prosopis tricolor, Schrottky.

♀.—Differs from the male thus: clypeus with an elongate-cuneiform rufo-fuscous mark on each side; antennæ entirely ferruginous; yellow band on prothorax interrupted in

middle ; marks at bases of tibiæ cream-colour. Schrottky only described the male.

San Bernardino, Paraguay, Oct. 21 (*K. Fiebrig*). U.S. Nat. Museum.

Prosopis flavohumeralis, sp. n.

♀.—Length about 6 mm., anterior wing 4·5.

Black, with yellow markings; mandibles ferruginous; labrum black; clypeus yellow except narrow lower margin and a stripe on each side, failing above; supraclypeal mark broadly subtriangular, while above it, on front, are two narrow yellow marks close together; lateral face-marks extending nearly to summit of eye, where they are broadly but very obliquely truncate, and diverge a little from the orbital margin; scape and flagellum dusky ferruginous beneath, darker above; front very densely and minutely punctured, vertex more coarsely; tubercles and the sharp projecting anterior lateral angles of prothorax yellow, but no other yellow on thorax; mesothorax and scutellum perfectly dull and coarsely punctured; area of metathorax with raised lines in the form of a square, but without the sculpture, except a microscopical cancellation all over; posterior truncation distinct; tegulæ with a yellow spot. Wings dusky; recurrent nervures meeting transverso-cubitals; marginal cell broad (deep). Legs with anterior tibiæ yellow in front, the others at base; tarsi more or less reddish. Abdomen shining, without hair-bands; first segment distinctly though minutely punctured, second and third extremely sparsely and indistinctly.

San Bernardino, Paraguay (*K. Fiebrig*). U.S. Nat. Museum.

In Schrottky's tables of Paraguay species this runs to *P. itapuensis*, Sky., but differs by the dusky wings and spots on angles of prothorax. It seems to closely resemble *P. lychnis*, Vachal, differing in the punctuation of the abdomen.

Prosopis howardiella, sp. n.

♂.—Length about 3·5 mm.

Head all black except a large obtusely trilobed (the sides concave) pale yellow patch on clypeus; scape black; flagellum thick, ferruginous beneath; thorax entirely black; mesothorax and scutellum with sparse very minute punctures on a microscopically tessellate surface; area of metathorax large, with a few small irregular basal plicæ, and a median raised line continuous to hind margin; posterior truncation of metathorax not clearly defined as usual, its upper lateral corners not defined at all, but its upper middle separated by a short ridge from the basal area, while an oblique ciliated ridge limits it on each side; abdomen impunctate, microscopically transversely lineolate, first segment narrowed. Wings clear, very faintly dusky apically; recurrent nervures ending a little before the transverso-cubitals; second submarginal cell nearly square, its inner and outer sides parallel; bases of tibiæ, and anterior tibiæ in front, cream-colour; tarsi pale ferruginous.

Oaxaca, Mexico, April 30 (*L. O. Howard*). U.S. National Museum.

Looks like some small Pemphredonid wasp, but is a true bee, with many plumose hairs on body. It is more or less related to Vachal's *P. recisa*, *P. puerula*, *P. fissa*, &c., but much smaller and very distinct.

Prosopis subgrisea, sp. n.

♀.—Length about 7 mm., anterior wing 5·3.

Black, with yellowish-white or brownish-white markings; mandibles and labrum black; clypeus long, black, the lower margin suffusedly reddish, but with a cream-coloured stripe running down its middle (not quite reaching upper end), not quite so broad as the area on either side; supraclypeal mark small, roundish; lateral face-marks linear, extending along orbital margins nearly halfway up front; scape and base of flagellum ferruginous, rest of flagellum black above and faintly reddish below; front appearing granular; upper part of prothorax with linear light margin, and greater part of tubercles light; a light band covering anterior half of scutellum, a band on postscutellum, and axillæ light; mesothorax dull, coarsely punctured; area of metathorax with coarse rugæ; posterior truncation and sides of metathorax densely covered with pale grey tomentum; pleura sparsely punctured; tegulæ with a light spot. Wings brownish hyaline, with the costal field, including marginal cell and beyond, fuliginous; hind tibiæ with rather more than basal half white. Abdomen dullish, the punctures excessively minute and close; first and second segments with yellowish-white marginal hair-bands, third to fifth with hind margins obscurely pallid; apex with dark fuscous hair.

San Rafael, Jicoltepec, Mexico. U.S. National Museum. From the Ashmead collection; no doubt collected by C. H. T. Townsend.

Resembles *P. mexicana,* Cresson, but easily separated by the linear lateral face-marks, and other characters. It is evidently closely allied to *P. maculipennis,* Smith, known only in the male, but that has yellow markings and the first abdominal segment rather strongly punctured.

Prosopis knabi, sp. n.

♂.—Length about 3·75 mm., anterior wing 3.

Black, with yellow markings; scape black, broadly red at end, and largely in front; flagellum entirely bright ferruginous, a little darker above; clypeus entirely, subtriangular supraclypeal mark (broader than long), and lateral face-marks all light yellowish, the latter ending obtusely on orbital margin about halfway up front (former practically as in *P. episcopalis,* Ckll.); pale marks of thorax confined to tubercles and a broadly interrupted line on prothorax above; tegulæ testaceous, hyaline in front, with a yellow spot; mesothorax closely and strongly punctured, scutellum rather more sparsely, the surface between the punctures smooth; base of metathorax with strong longitudinal and transverse rugæ, but the sculpture is mainly and essentially transverse; whole sides of thorax strongly punctured, the metathorax at sides bare (without grey tomentum); knees, anterior tibiæ (except a large patch behind), middle and hind tibiæ very broadly at base and narrowly at apex, and the tarsi all pale yellow. Wings clear; stigma and nervures sepia; first recurrent nervure joining first submarginal cell a short distance before its end. Abdomen appearing impunctate under a lens, but the microscope shows minute punctures on first segment.

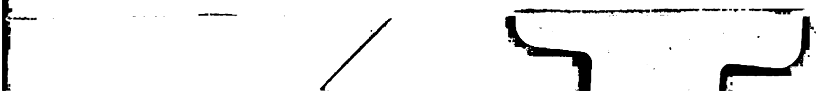
Champerico, Guatemala, Aug. 4, 1905 (*Frederick Knab*). U.S. National Museum.

This minute species recalls some of those of the United States, such as *P. modesta,* Say, but it will be readily known by the red flagellum and transverse rugæ at base of metathorax.

The following localities are new:—

Prosopis mexicana, Cresson. Tampico, Mexico, Dec. 15 (*E. A. Schwarz*); Frontera, Mexico.

Prosopis azteca, Cresson. San Rafael, Jicoltepec, Mexico (*L. O. Howard*).



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From the Annals and Magazine of Natural History,
Ser. 9, Vol. iii., *January* 1919.

Descriptions and Records of Bees.—LXXXIII.

By T. D. A. Cockerell, University of Colorado.

Proteraner rhois, Cockerell.

Male, Meadow Valley, Mexico (*Townsend*).
New to Mexico.

Sphecodes mexicanorum, sp. n.

♀.—Length about 8·5 mm.

Black, with the abdomen red, the first segment with a large black area occupying the base and extending more than halfway to apex in middle, the third and fourth segments with a black stain in middle, the fifth and apical segments black. Head and thorax with dull white hair; mandibles dark reddish apically, with a blunt inner tooth far from apex; labrum short, simple, transversely sulcate; antennæ entirely dark; clypeus strongly punctured; front finely and densely punctured; mesothorax and scutellum strongly punctured, but shining, the punctures quite widely separated on disk; area of metathorax shining, with about twelve strong longitudinal plicæ; posterior face of metathorax very coarsely punctured; tegulæ rufo-fuscous. Wings dusky, stigma and nervures dark brown. Legs very dark reddish brown; spurs ferruginous. Abdomen not appreciably constricted between first and second segments; first segment impunctate, the following with extremely fine punctures in the basal region; apical segments with hoary pubescence.

Meadow Valley, Mexico (*C. H. T. Townsend*). U.S. Nat. Museum.

In my table in Ann. & Mag. Nat. Hist., Nov. 1907, this runs to *S. dichrous*, Smith, from which it is readily known by the impunctate first abdominal segment and other characters. On account of the thin hoary pubescence on apical part of abdomen it recalls *S. pilosulus*, Smith, from Oaxaca, but that has the thorax closely punctured.

Melissodes albocincta, sp. n.

♀.—Length about 10 mm.

Compact, black; antennæ beyond the fourth joint ferruginous beneath; eyes pale grey; small joints of tarsi reddish; tegulæ piceous, posteriorly paler and reddish. Wings faintly dusky, nervures and stigma dark brown; hind margins of abdominal segments (first narrowly, second broadly) colourless; pubescence greyish white, pale on vertex, but disk of scutellum with fuscous hair. Hair on outer side of tibiæ and tarsi suffused with reddish, on inner side of hind basitarsi bright ferruginous; hind tibial scopa long, loose, and strongly plumose; hind margins of abdominal segments 2 to 4 with broad felt-like entire white hair-bands; black parts of first three segments exposed and shining, hardly punctured, but that of fourth covered with very short fuscous hair; fifth segment covered with dark chocolate hair, paler at margin, creamy-white at extreme sides; pygidial plate narrow; mesothorax and scutellum highly polished and sparsely punctured, the mesothorax with a shallow median longitudinal groove.

Mexico (Baker collection, 2320). U.S. Nat. Museum.

This may be referable to *Xenoglossodes*; I have not ventured to extract the mouth-parts of the unique type. It certainly closely resembles *X. excurrens*, Ckll., differing principally by the white hind margins of abdominal segments. In my table of *Melissodes* (1906) it runs next to *M. martini*, Ckll., which it does not resemble.

Ptilothrix heterochroa, sp. n.

♀ (type).—Length about 10·5 mm.; anterior wing 7·7 mm.

Black, with black and greyish-white hair; hair at sides of abdominal segments 2 to 4 strongly washed with orange, which extends some distance along the bands on 3 and 4; fifth segment with dark fuscous hair in middle and orange at sides; flagellum obscure reddish beneath; mandibles chestnut-red in middle; clypeus prominent, bare, highly polished, with sparse distinct punctures; front and sides of face with white hair, but vertex with black; face broad; tegulæ rufo-piceous. Wings reddish. Hair of upper part of thorax greyish white, but a fuscous band across mesothorax and another across scutellum; lower half of mesopleura with dark chocolate hair; mesothorax highly polished, with sparse punctures. Legs dark reddish, their hair black; hind spurs curved at end.

Very close to *P. tricolor* (Friese), but much smaller, with narrower abdomen, more sparsely punctured disk of mesothorax, and smoother, more polished basal area of metathorax.

♂.—Antennæ hardly reddened beneath; face and lower part of cheeks with white hair, but the black hair of vertex also invades upper part of front; clypeus finely and rather closely punctured; thorax above with black hair, the margins of the mesothorax (broadly in front) with greyish white; pleura with black hair, but a tuft of greyish white just below tegulæ; thorax posteriorly with black hair; small joints of tarsi red; abdomen with black hair; a cuneiform orange patch at each side of third and fourth segments, a little of the same at sides of fifth; greyish-white hair at sides of first and second, and disks of these segments with very thin greyish-white hair, but hair on base of first segment black.

Carcarana, Argentina (*L. Bruner*). U.S. Nat. Museum.

The female (81) is the type; the male (56) seems to be correctly associated, but it differs much in appearance and may possibly belong to a different species.

Diadasia separata (Holmberg).

Carcarana, Argentina (*Bruner*, male 42, female 68).

This is *Teleutemnesta separata*, Holmberg. Holmberg described only the female; the male is similar, but the flagellum is only faintly reddish beneath, and there is no red hair at end of abdomen. The hind basitarsi are slender and curved.

Ceratina nautlana, Cockerell.

Vera Cruz, Mexico, Dec. 14, 1907 (*F. Knab*).

The wings are browner than usual.

Heriades sauteri philippinensis (Friese).

Philippine Islands; the type from Los Banos. A female from Manila (*Robert Brown*) is in U.S. Nat. Museum.

This differs from *H. sauteri* in the more finely punctured mesothorax and first abdominal segment.

Trigona itama, Cockerell.

Described from Singapore, but I cannot distinguish a specimen from Pelaboean Ratoe, Java (*Bryant & Palmer*), in U.S. Nat. Museum.

The black tegulæ distinguish it from *T. iridipennis*, Smith, which seems to be the common species in Java. The wings are fuliginous.

Nomia bantarica, sp. n.

♂.—Length nearly 8 mm.; anterior wing 6·7 mm.

Head black, with the clypeus (except sides above) and region of mouth ferruginous; mandibles very pale basally, dark chestnut-red apically; face densely covered with golden pile; vertex polished and shining; scape clear ferruginous; flagellum black above and red beneath; thorax black, with the tubercles, scutellum, and postscutellum clear red; upper border of prothorax densely covered with cream-coloured tomentum; mesothorax bare, dullish, the sculpture extremely fine; scutellum convex, not at all bigibbous; metathorax highly polished; tegulæ testaceous. Wings dusky, nervures and the large stigma dusky reddish; second s.m. small, third long. Legs clear light ferruginous, with concolorous hair; hind legs simple, but the femora and tibiæ rather stout. Abdomen smooth and shining, without hair-bands, ferruginous, with a large black patch on each side of second segment, third and fourth segments with very broad black bands. The tegulæ are not enlarged.

Bantar, Gebang, Java (*Bryant & Palmer*). U.S. Nat. Museum.

By its coloration it recalls *N. gribodoi*, Vachal, from Borneo, but that has the abdomen eight-spotted and the scutellum bigibbous.

Halictus læviventris, Pérez.

Tokyo, Japan (*Sasaki*, 149).

Pérez says this is of the size of *H. fallax*, which would be 7·5–8 mm., but he says that *H. discrepans*, 8 mm. long, is smaller than *læviventris*. The specimens of *læviventris* before me are about 9 mm. long, anterior wing 7·5 mm. The first abdominal segment is highly polished and impunctate. The insect is in all respects closely allied to *H. sexnotatus*, Kirby.

Halictus occidens, Smith.

Kiso-fukushima, Japan, July 27, 1914 (*Sasaki*, 174).

The lateral borders of posterior face of metathorax are sharply margined. The hind spur has broad, rounded, nodule-like teeth.

Halictus tsushimensis, n. n.

Halictus orientalis, Pérez, 1905 (not of Lepeletier, 1841).

Tsushima, Japan.

Allied to *H. occidens*, but with more punctured abdomen and very smoky wings.

Halictus basicirus, sp. n.

♀.—Length about 8 mm.; anterior wing about 6·5 mm.

Black, including the legs and hind margins of abdominal segments; head longer than broad, but not oval; mandibles reddened at apex; head and thorax with abundant pale ochreous hair, that on postscutellum light ferruginous; clypeus shining and well punctured; mesothorax very densely punctured, but shining between the punctures; area of metathorax semilunar, rather short, with fine, regular, but rather wavy longitudinal plicæ; posterior truncation very hairy, not conspicuously defined; tegulæ piceous. Wings hyaline, stigma and nervures amber-colour. Legs with pale ochreous hair, a line of fuscous on outer side of hind tibiæ; hind spur very minutely nodulose, appearing simple under a lens. First abdominal segment polished and shining, minutely punctured all over, the base broadly and densely covered with long pale ochreous hair; remaining segments also shining and punctured, the bases of segments 2 to 4 with entire bands of ochreous-tinted tomentum; caudal rima fringed with pale ochreous hair.

Japan, marked 167 and 358, but what these numbers signify I do not know. U.S. Nat. Museum.

In the Japanese fauna it seems nearest to *A. japonicola*, Strand, but it is larger and does not show the microscopic sculpture between the punctures on mesothorax and first abdominal segment. It is very close to *H. perangulatus*, Ckll., from Formosa, but the posterior part of mesothorax is much more closely punctured.

Halictus japonicus, Dalla Torre.

Smith described the male under the preoccupied name *H. tarsatus*. I found the female in the British Museum collection, and, as Vachal himself suggested, it appears to be the same as *H. tæniolellus*, Vachal, which may be safely regarded as a synonym.

Halictus subopacus, Smith.

Soochow, China (*N. Gist Gee*, 118, 119).

Another species of the type of *H. basicirus*, from which it is known by the dullish and closely punctured first abdominal segment.

Halictus poonaënsis, n. n.

Halictus torridus, Cameron, 1898 (not Smith, 1879).

Poona, India.

Halictus nusaënsis, Friese, in litt., 1914.

Halictus nigroviridis, Friese, 1914 (not Graenicher)

Java.

Halictus bryanti, sp. n.

♀.—Length about 8 mm.; anterior wing 6 mm.

Black, robust, with unusually broad abdomen, the sides of which are parallel except at the ends; hair of head and thorax scanty, dull white, the postscutellum with white tomentum; head ordinary; mandibles only faintly reddish at apex; face thinly covered with pale hair; clypeus with weak shallow punctures, the subapical middle depressed; front dull, vertex shining; flagellum very faintly brownish beneath; mesothorax shining but not highly polished (the surface being microscopically tessellate), with small sparse punctures; scutellum more polished, slightly bigibbous; mesopleura almost entirely opaque; area of metathorax short, with very distinct plicæ on its basal part; posterior truncation shining, impunctate, sharply margined at sides; tegulæ black, dark reddish in middle. Wings dusky; nervures and stigma dark fuscous. Legs black, with pale hair, fuscous bands on outer side of middle and hind tibiæ; hind spur with three very large obtuse spines. Abdomen shining, but the surface minutely lineolate, and with excessively minute punctures scattered all over; bases of segments with dull white hair, conspicuous and dense at sides of second; hind margins black; segments 3 and 4 with rather obscure subapical hair-bands.

Buitenzorg, Java, March 1909 (*Bryant & Palmer*). U.S. Nat. Museum.

In Friese's table of Java *Halictus* (1914) this runs nearest to *H. thoracicus*, Friese, which Messrs. Bryant & Palmer also took at Buitenzorg, but the sculpture of the thorax is entirely different.

Halictus palmeri, sp. n.

♂.—Length about 5·5 mm.; anterior wing 5 mm.

Black, rather robust for a male; head and thorax with very scanty dull white hair; head ordinary; clypeus produced, wholly black, shining, with sparse punctures; front slightly shining, with fine punctures; flagellum very faintly brownish; mesothorax and scutellum very highly polished, with only microscopical sparse punctures; area of metathorax rather long, with very fine anastomosing plicæ, appearing dull and granular under a lens; tegulæ dark reddish. Wings dusky; stigma and nervures dark reddish. Legs black, tarsi reddish apically. Abdomen shining, impunctate, with thin pale hair on apical part, small patches of white hair at lateral bases of second and third segments.

Tjibodas, Mt. Gede, Java, alt. 4500 ft., Oct. 9, 1909 (*Bryant & Palmer*). U.S. Nat. Museum.

Distinct from the species previously described from Java by the highly polished mesothorax, without evident punctures.

Halictus gedensis, sp. n.

♀.—Length about 6·5 mm.; anterior wing 6 mm.

Black, the head and thorax with scanty dull white hair; head ordinary, rather broad; mandibles black; clypeus shining, sparsely punctured, it and the supraclypeal area distinctly longitudinally ridged in middle; front dull; flagellum very obscurely reddish beneath; mesothorax shining, but not highly polished, with small shallow punctures, and the surface microscopically tessellate between; scutellum with a median sulcus; postscutellum with long hair; area of metathorax poorly defined, with irregular plicæ on basal part; posterior truncation small; tegulæ reddish black. Wings dusky, long and ample; stigma and nervures dark brown. Legs black, with pale hair; hind spur white, with seven short spines. Abdomen shining, impunctate, without hair-bands; apical part and general surface more or less with pale hair, abundant on fifth segment.

Tjibodas, Mt. Gede, Java, alt. 5000 ft. (*Bryant & Palmer*). U.S. Nat. Museum.

Runs in Friese's table to the much larger *H. jacobsoni*, Friese.